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ABSTRACT

A computer program was developed with the potential to: demonstrate the power and uses of computers to students of environmental interpretation; show the use of computers for modeling in the realm of environmental interpretation; and show the use of computers as learning tools for students of environmental interpretation. A computer simulation game was developed to address these three areas simultaneously. By making the game easy and fun, it was hoped that students would learn that computers can be simple and enjoyable to operate. By creating a simulation game, it was hoped that future interpreters could see how computers can be used for modeling. And by patterning the game after the interpretive planning process, it was hoped that a teaching instrument would develop which would sharpen skills of direct use in the field. The object of the game is to draw up the best possible interpretive plan working within constraints imposed by a budget, deadline, and three components of interpretation (site, organization, and visitor). This document describes the game, discusses how it was designed and developed, makes inferences from the research, and makes recommendations for future projects. Supporting documentation, including availability of the game and documentation package, is included in appendices. (Author/JN)

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INTERP

A COMPUTER SIMULATION GAME OF
THE INTERPRETIVE PLANNING PROCESS

A Thesis

Presented in Partial Fulfillment of the Requirements
for the Degree Master of Science

by

John L. Macko, B.S.

The Ohio State University
1982

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INTRODUCTION

Computers are very quickly becoming assimilated into virtually every aspect of modern life. The "silicon revolution" has brought heretofore unheard of applications of electronic information processors to reality. If Environmental Interpretation is to keep up with and take advantage of this rapidly advancing new technology, it is appropriate to initiate activity at the earliest possible moment. The power and uses of the computer must be demonstrated to students of interpretation. Tomorrow's interpreters must be provided with a sound foundation in data processing so that they can use machines to do their jobs better and more efficiently.

Environmental Interpretation is an area of study in its infancy. One of its goals is to improve the effectiveness with which information is presented (Wagar, J. Alan in Sharpe, 1976). The tremendous number of variables involved in this endeavor is staggering. Sophisticated computer modeling and data analysis can organize this mountain of information to manageable proportions. Use of electronic information processing is necessary for Environmental Interpretation to formulate and test its theories.

In addition to the two points noted above, computers can be powerful tools for learning. A machine can be a patient yet exacting teacher, creating artificial environments in which students can test

their wings without fear of falling (Trachtman, 1981). As interpretive students are presented with more and more information to assimilate, the computer can again be of service.

This thesis proposed to be one of the beginnings of the collaboration between Environmental Interpretation and Computer Science. The objective of this formative research was to produce a computer program with the potential to

1. Demonstrate the power and uses of computers to students of environmental interpretation
2. Show how computers can be used for modeling in the realm of environmental interpretation
3. Show how computers can be used as learning tools for students of environmental interpretation

In order to address all three areas simultaneously, this research project took the form of development of a computer simulation game. By making the game easy and fun to play, it was hoped that students of interpretation would learn that computers can be simple and enjoyable to operate. By creating a simulation game, it was hoped that future interpreters could see how computers can be used for modeling. And by patterning the game after the interpretive planning process (Bradley, Gordon A. in Sharpe, 1976), it was hoped that a teaching instrument would develop which would sharpen skills of direct use in the field.

This document describes the game, discusses how it was designed and developed, makes inferences from the work done, and

provides recommendations for future projects. Though this material can provide a substantive understanding of the thesis, it is little more than documentation for the game. The heart of the project was the computer system which was developed. The reader is encouraged to experience INTERP firsthand.

REVIEW OF THE LITERATURE

This thesis sought to bring about a collaboration between the disciplines of Environmental Interpretation and Computer Science (particularly computer simulation). A review of these concepts and of previous work in the area is presented in this section.

Interpretation is an organizationally sponsored activity and/or process which involves non-formal recreational and/or environmental learning in a non-work place (Mullins, 1981). Learning, in this context, is defined as information transfer.

Though in its infancy, interpretation is an important part of today's world. As technology provides humankind with more and more leisure time, individuals are demanding more and better recreational experiences. Interpretation strives to satisfy some of this demand. It seeks to provide understanding which can solve real problems in non-formal recreational/environmental learning (Sharpe, 1976).

In essence, interpretation is another facet of communications within natural resources. Improvement of the process of communication has always been and is an important endeavor. Effective sharing of ideas leads to advancement of knowledge.

Since interpretation is a relatively new discipline, its theories and concepts are just beginning to develop. One such concept

proposes that interpretation is made up of three components: the site (the resource base), the organization (the management agency which sponsors the interpretive programs at the site), and the visitor (Mullins, 1980). The organization is included since interpretation is an organizationally sponsored activity. The site (the non-work place) is a necessary component due to the fact that interpretation involves firsthand experience. And the visitor, of course, is essential in the recreational/environmental communication process. These three components continually interact and change. What is beneficial for one may be detrimental to another; work must be done to keep the three in a position of balance.

The model presented above was the theory which underlay the formative research described in this document.

Computer Science was the other discipline involved in this project. This discussion now turns to a review of that area, specifically computer simulation.

Computers are tools. As such, their utility is limited only by the imagination and the skill of the user. These tools--albeit sophisticated tools--have slowly been working their way into the hands of environmental interpreters. Thus far, limited applications of computers specific to interpretation have developed. The emphasis has been on general programs, packages, and concepts to meet interpreter's needs: word processors to create, edit, and manipulate text; data base management systems to store and retrieve information; accounting

packages to manage budgets; mathematics programs to perform complex calculations.

As computers become smaller and less expensive, their availability and utility are increasing (Martin, 1976). As individuals find more and more computing power at their disposal, they are attempting to use the machines to tackle tasks never before considered.

One area which has great potential for application of the computer is that of simulation. A computer simulation is a model designed to replicate the functionings of a real system. If the model is a good one, it can be used for prediction and to test theories (Kowal, Norman E. in Patten, 1971).

Of course, mathematical models were in use before the advent of the computer. The electronic information processor, however, has made two major contributions to the area of modeling: reliability and speed (Fafllick, 1982). Highly complex models comprised of complicated formulas, relationships and/or algorithms can now be handled accurately and at a fraction of the time previously required. Computers allow variables in a model to be easily modified and make it possible to see, in a relatively short time, the effect the modification will have after the passage of simulated days, weeks, or even thousands of years.

While simulations deal with replication, games deal with competition. A game involves two or more competing entities engaged in an activity defined by arbitrary rules. Computers have always had the capability for gaming, but their sizes and costs were prohibitive in the past. Today's technology has so reduced the dimensions and prices of the machines that computerized games abound (Trachtman, 1981). Some of these games are educational in nature: programs exist to teach environmental relationships, explain energy demands, enlarge vocabularies, and teach health and fitness facts, to name just a few.

INTERP is a simulation game: it models a real world situation while pitting the player against a problem situation. It has elements of both replication and competition, with an overall objective to provide an opportunity to learn.

DESCRIPTION

Since INTERP is a simulation game, it is set in a scenario. The player is an interpreter who has just been assigned the task of writing an interpretive plan for a site. The interpreter (player) and his or her supervisor have met and, after much study, selected a number of items from the site's master plan for which the greatest need currently exists. Unfortunately, the budget for the coming fiscal period may limit the number of items which will be implemented. As an additional constraint, a deadline has been set by which the plan must be completed.

Along with monitoring budget and time limitations, the player has to be aware of the effect each decision has on the three components of interpretation: the site (the resource base), the organization (the management agency which sponsors the interpretive programs at the site), and the visitor. The player may try to balance the effects on the three components, or may attempt to maximize the benefits accrued to one component of his/her selection. The object of the game is to draw up the best possible interpretive plan working within the constraints imposed by the budget, the deadline, and the effect each decision has on the three components.

When the game is run the first thing that appears is a title screen which is very similar in format to the first page of this

thesis. The screen displays the title, the author's name, the author's adviser's name, and the fact that the program was written in partial fulfillment of the requirements for the degree Master of Science at The Ohio State University.

After the title screen is displayed the player is asked whether or not an explanation of the game is needed. If the answer is yes, the computer formats several screens of information which explain how the game is played and describe the scenario in which it is set. A complete listing of all the introductory screens appears in Appendix A.

Before anything else happens, the player is asked to make a commitment as to the bias which he or she will pursue during the game: an attempt may be made to balance the three components of interpretation, or the player may try to maximize the benefits received by any one component. Once this choice has been made, a new screen is formatted to confirm the selection and also to provide two important pieces of information: the time frame in which the interpretive plan must be completed and the budget--the maximum amount of money which, when approved, the plan can spend. The budget is expressed in dollars and the time frame in both hours and eight hour person-days. These two values are randomly generated (within certain limits) so that different sessions of the game provide different challenges. The randomness is achieved through the use of the machine's built in random number generator.

After reading the introductory screens the player begins the actual game by requesting the computer to format the main playing screen. The heading at the top of this screen always presents a current summary of the player's use of time and money. For both time frame and budget, values are displayed showing the amount originally allocated, the amount spent, and the amount remaining. Under the heading are several numbered lines of text. Each line very briefly describes one item which the player may include in the interpretive plan which is to be designed. These items are randomly selected from a master list, again in order to help make each session of the game different. A representation of the main playing screen is presented in Figure 1.

It is the player's job to design an interpretive plan by selecting items from the main playing screen. The process by which this is done is explained below, using the screen presented in Figure 1 as an example.

In order to learn more about any item on the main playing screen, the player must type in the item's corresponding number. In the example, suppose that the player was interested in including a "Nature Trail" in the interpretive plan. In this case the number "15" would be entered. After the selection is made, two new screens come up which explain the item in more detail. The first screen provides a narrative description of the item, and the second explains the different ways in which the item may be implemented. An example of how these screens appear are presented in Figures 2-1 and 2-2.

INTERP -- MAIN PLAYING SCREEN

TIME FRAME: 336 HOURS (42 DAYS)	BUDGET: \$ 33560
TIME SPENT: 0 HOURS (0 DAYS)	AMOUNT SPENT: \$ 0
TIME REMAINING: 336 HOURS (42 DAYS)	AMOUNT REMAINING: \$ 33560

01. BULLETIN BOARD	11. PUBLIC ADDRESS SYSTEM
02. SLIDE PROJECTION SYSTEM	12. SITE DAMAGE PREVENTION
03. SELF-GUIDING TRAIL	13. VISITOR ORIENTATION AID
04. SKY INTERPRFTATION	14. BICYCLE PATH
05. COMPUTER SYSTEM	15. NATURE TRAIL
06. WAYSIDE SIGN	16. BIRD WATCHING BINOCULARS
07. INFORMATION HANDOUT	17. WEATHEP INSTRUMENTATION
08. SLIDE PRESENTATION	18. MARSH AREA TRAIL
09. PROTECTION OF OVERUSED AREA	19. CLEAN-UP ACTIVITY
10. INTERPRETIVE CENTER EXHIBIT	20. PROGRAMS FOR CHILDREN

Figure 1

Example of a Main Playing Screen

NATURE TRAIL

A NEW NATURE TRAIL IS NEEDED IN AN AREA IN CLOSE PROXIMITY TO THE VISITOR CENTER. THIS TRAIL'S INTENDED USE WILL BE FOR DAY HIKES AND CONDUCTED TOURS. IT WILL NOT BE SELF-GUIDING. IT WILL BE ONE-HALF MILE LONG, AN AVERAGE OF 6 FEET WIDE, AND FAIRLY LEVEL THROUGHOUT WITH A MAXIMUM GRADE OF 8 PERCENT. OPTIONS TO BE CONSIDERED INVOLVE THE MATERIAL TO BE USED FOR THE TRAIL SURFACE (SOIL AND LEAF LITTER, WOOD CHIPS, OR PAVED WITH ASPHALT) AND WHETHER OR NOT REDUNDANT TRAILS SHOULD BE CONSTRUCTED. THE USE OF REDUNDANT TRAILS WOULD BE ALTERNATED, ALLOWING TIME FOR PORTIONS OF THE AREA TO "REST." (NOTE--ROUGHLY 7% OF THE VISITORS TO THE SITE HAVE NEED OF WHEELCHAIRS.)

Figure 2-1

Example of a screen explaining an item in detail

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) AN UNPAVED TRAIL (SOIL AND LEAF LITTER SURFACE)	0	-1	-1	21000
B) REDUNDANT UNPAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)	1	0	0	42000
C) A TRAIL WITH A WOOD CHIP SURFACE	0	-1	1	49000
D) A PAVED TRAIL (SURFACED WITH ASPHALT)	1	-1	2	34300
F) REDUNDANT PAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)	-2	-2	0	68640
KEY THE APPROPRIATE LETTER TO IMPLEMENT AN OPTION				
KEY "O", "S", "V", OR "\$" TO INITIATE IMPACT STUDIES				
PRESS THE <SPACE BAR> TO RETURN TO THE MAIN PLAYING SCREEN				

Figure 2-2

Example of an Implementation Option Screen

After examining the information presented for a particular item, the player may wish to implement one of the options presented. This is accomplished by keying in the letter associated with the desired option (in this example, "A", "B", "C", "D", or "E"). Chances are good, however, particularly for the novice player, that more information will be needed before an intelligent decision can be made. The player may obtain additional information by entering one of four special symbols: "O", "S", "V", or "\$". These symbols are interpreted by the computer as requests for the following data:

- O = How each option will affect the Organization
- S = How each option will affect the Site
- V = How each option will affect the Visitor
- \$ = How much each option will cost

Though it seems that these four symbols make life easy for the player, there is a cost! Each piece of additional information can be thought of as being the results of a study, e.g. an environmental impact study, a cost/benefit analysis, or a visitor survey. In order to receive a piece of additional information, the player has to "spend" the amount of time it would normally take to complete such a study. (The assumption is that the player as interpreter has only his or her own time as a resource--no help or funds are available for obtaining data.) The time associated with each study is again randomly generated within certain bounds for each game; the bounds vary depending on the type of study requested and the nature of what is to be studied.

When a player requests that a study be performed, he or she is informed as to how long the study will take and is asked whether or

not the time should, in fact, be spent. If the player decides to spend the time, the results of the study are presented in a column to the right of the options. The results of the cost study ("\$\$") are presented as dollar figures. The other results are displayed using the following key:

- +3 = The option would be extremely beneficial to the component in question
- +2 = The option would be beneficial to the component in question
- +1 = The option would be slightly beneficial to the component in question
- 0 = The option would have virtually no effect on the component in question
- 1 = The option would be slightly detrimental to the component in question
- 2 = The option would be detrimental to the component in question
- 3 = The option would be extremely detrimental to the component in question

The "Implementation Option Screen" presented in Figure 2-2 (page 8) appears as it would if the player had requested that all four studies be performed.

After examining several items and reviewing the results of as many "studies" as necessary, the player eventually has to begin building the interpretive plan. As each item is selected for inclusion, its cost is deducted from the player's budget. In addition, each choice made has certain ramifications for the balance among the three components of interpretation--as each item is included the balance is correspondingly affected.

In order that a player may track the balance among the three components, another command is at his or her disposal. It is possible

to enter the letter "G" at any time to direct the computer to display a graph, a visual display, of the current state of the balance. The graph uses the letters "O", "S" and "V" to represent the Organization, the Site, and the Visitor respectively. A vertical line in the center of the graph indicates the position of balance. The letters move to the right or left of the line as decisions are made to include items which are beneficial or detrimental to each component. An idea of how this graph appears is presented in Figures 3-1 and 3-2.

Play continues until either time runs out or the player indicates that the plan is complete by entering the "Q" ("Quit") command. At this point the computer will evaluate the net effect of all of the decisions made throughout the game and decide whether or not the player met his or her objective of either balancing the three components of interpretation or maximizing one of the three. If the objective is met, an efficiency rating between 0 and 100 is displayed. This score is based on the number of items implemented, which items were implemented (i.e. the rank of each of the items implemented), and the amount of time and money which the player had at his or her disposal. For example, a player who had a small budget and a short amount of time would score very well if a large number of important items were to be included in the plan.

In addition to the efficiency rating, a summary of the game is displayed including the amount of time and money originally allotted to the player, the time spent and amount of money used, the bias pursued, and the final state of the balance among the three

Component Balance Graph



Figure 3-1

The three components of interpretation are balanced.

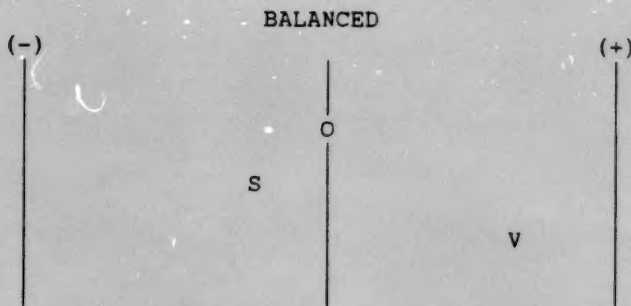


Figure 3-2

Items have been included in the interpretive plan which have the net effect of being slightly detrimental to the site and and very beneficial to the visitor.

components. If desired, the player can obtain a hard copy listing of the summary personalized with his or her name.

A few other miscellaneous rules which should be mentioned are as follows:

1. Whenever the player switches to a screen describing an item in detail, a small amount of time (two hours) is deducted from the time remaining. This factor was introduced to simulate the passage of time in a real-world planning situation: sooner or later the player reluctant to make decisions will be forced to do so or else not meet the deadline.
2. Each item can only be included once in the interpretive plan. As an item is included, it is marked on the main playing screen as being no longer available.
3. Once a player has requested a certain piece of information via the "G", "S", "V", or "\$" commands, he or she may review the results of the study without further loss of time (aside from the nominal "cost" of switching from screen to screen). In other words, the computer remembers which studies have been performed and automatically displays the results when and if the player returns to reconsider an item.

During the normal course of play events may occur to surprise even the veteran player. For example, the interpreter's (player's) supervisor may suddenly announce that the plan is needed earlier than originally planned, and 100 hours are deducted from the time remaining. Or the budget might suddenly be decreased. These random events vary from game to game.

INTERP is designed to be easy to play. All the commands consist of one or two keystrokes; the screens lead the player through the game. It is often difficult to go wrong. For example, if the machine is expecting an answer to a "yes" or "no" question, all the

keys on the keyboard are turned off except for "Y" and "N". If a mistake is made, special screens are formatted to inform the player of the error and guide his or her next move. Though the rules of the game are somewhat involved, the computer monitors all the details so that the player can concentrate on the problem at hand. In this respect the game acts very much like the computer support tools used by researchers in science and industry--the machine handles the laborious details, leaving the scientists with time to be creative.

METHODOLOGY

INTERP was conceptualized out of the need for collaboration between the disciplines of Environmental Interpretation and Computer Science. It was recognized that it would be desirable to develop a program to demonstrate the power and uses of computers to future interpreters and to encourage use of the machines for modeling and learning.

Once a simulation game was decided on, the design phase of the project began. The chief source of ideas was a review of literature dealing with computer simulation, game theory, and environmental interpretation. Existing simulation games were also investigated. Once the basic framework was designed the game evolved quite rapidly: each piece that was added suggested new ideas. It should be noted that further enhancements are still suggesting themselves. Hopefully, future research will allow the game to improve even further.

INTERP was developed on a Radio Shack TRS-80 computer owned by the School of Natural Resources of the Ohio State University. This machine has a complement of 32K of memory (32,768 storage locations) and two disk drives; each drive has 83,060 bytes (storage locations) available to the user. A local printer is also connected to the system. Familiarity with the operation, capabilities, and languages of the machine was gained through study of the manuals published by the

manufacturer of the computer (consult the bibliography for a listing of these publications).

The next step was to write a prototype for INTERP. A prototype is a simple program which simulates the output and functioning of a larger, more sophisticated program yet to be written. Compared to the program which is being simulated, a prototype contains very little logic and very little code (very few computer program instructions). A prototype is to a programmer what a scale model is to an architect.

The prototype produced by this project did nothing more than display playing screens in a specified order. Every time the prototype was run by the computer, the same screens appeared in the same sequence. No attention was paid to any input by the player. Yet in the hands of an operator who was familiar with the screens that were displayed, the simple program seemed to be a finished product capable of "playing" a game of INTERP. This prototype was written for three reasons: planning, learning, and communication. The program suggested improvements and uncovered flaws in the plans for the game. It was a means of gaining familiarity with the machine. And, finally, it was able to be used, at a very early stage, to demonstrate how INTERP would work when it was completed.

Once the design of the game reached its final form, the next step was to select the thirty items for the computer's master list and write the text and options for each. An effort was made to select

items so as to keep the game's fictitious site as general as possible. Ideas for the items came from investigation of interpretive sites, consultation with professional interpreters, and review of interpretive literature. A difficult aspect of this task was the conciseness with which the text had to be written: limitations imposed by the design of the game and the machine allowed only eleven lines of sixty-four characters each for the description, and two lines of thirty-eight characters apiece for each of the options.

The collection of data to be used by the game program was the next piece of work to be addressed. The data which were needed fell into three categories: (1) the cost of each option, (2) the amount of time necessary to complete the studies which could be performed for each item, and (3) the impact each option would have, if implemented, on each of the three components of interpretation. It was important that these data be fairly reflective of conditions in the real world in order that the game fulfill its objective of being a learning tool.

A different methodology was used to obtain each of the three sets of data. The first set, the cost of each option, was obtained through straightforward investigation: catalogs, price lists, telephone calls and personal interviews all were used to obtain the required prices.

The second set of data, the amount of time necessary to complete the studies which could be performed for each item, was

fairly easy to obtain. Often, the study had to actually be performed (e.g. determination of the cost of an item) and the amount of time necessary could be measured directly. In other cases, it was found that a similar study had been done in the past and the time required could be reasonably extrapolated. It should be remembered that this set of numbers is used only as a base for the random values generated by the computer for each game.

The final set of data, the impact each option has, if implemented, on each of the three components of interpretation, received the most attention. Since the organization, site, visitors and situations in the game are all imaginary, it was felt that research alone could not provide the needed figures. To solve the problem, help was sought from fifteen professionals in fields related to the game: environmental interpretation, computer science, parks and recreation administration, and modeling and game theory.

A survey was used to collect the data; the cover letter for this survey and a sample questionnaire are presented in Appendix B. Each professional was asked to consider ten of the thirty items and to evaluate the impact each option would have on the three components. Note that each item was thus evaluated by five different individuals. The technique used for evaluation was the same "+3" to "-3" scale used by the game and described in the previous section of this document. When all the surveys had been returned, the results were averaged (simple arithmetic mean) and the resulting data were entered into the game.

The thirty items, their descriptions and options, and all of the data associated with them are presented in Appendix C. In reviewing the various facts and figures, it is important to remember that INTERP emphasizes the processes of interpretive planning and decision making. The data and situations presented to the player are all flexible and could easily be changed. Recall the role of the computer during the game. To the player, the machine is omniscient. If it says that an option will be detrimental to the site, it can be trusted. If it quotes a price for a new facility, not a penny more will be charged. The player's task, and the primary thrust of the game, is to make decisions based on the available data.

Every time a game of INTERP is started, a new budget and time frame (deadline) are randomly generated within certain bounds. After all the information for the thirty items had been gathered, the bounds for these two random values were decided on. To compute the minimum budget, the least expensive option from each of the thirty items was identified. Of these amounts, the twenty smallest values (recall that there are twenty items on the main playing screen) were identified and summed. This result, \$2,200, became the minimum budget which could be assigned. Similarly, the sum of the twenty most expensive options that could possibly be implemented in a single game was programmed in as the maximum budget: \$613,500.

The bounds for the time frame were based on the design of the game. Since there are twenty items which could be investigated, and

since it takes two hours to look at any item, the minimum deadline which can be imposed was set to five days (eight-hour working days). Note that this minimum allows no time for any studies. The maximum deadline was dictated by a programming design limitation: the number of days displayed on the main playing screen can be, at most, a two digit number. Therefore, a player never has more than ninety-nine days to complete his or her interpretive plan.

Concurrent with the collection of data the INTERP program itself was written. The source code for the program--the set of computer instructions--was written in the BASIC (Beginner's All-purpose Symbolic Instructional Code) language. There were two reasons for this choice. First of all, BASIC is fairly universal. This fact makes the program fairly easy to migrate from one machine to another (i.e. computers of different makes and models). This ease of migration will hopefully allow a large number of individuals and institutions to use the game. The second reason for the choice of BASIC has to do with the fact that one of the objectives of this project was to teach interpretive students that a computer can be a very useful tool which is easy and enjoyable to use. The BASIC language is fairly easy to learn and understand, and if any interpretive student becomes interested enough in the game to want to understand how it works, his or her initiative will not be frustrated with complicated computer languages and/or techniques.

Once it was determined that sufficient unused memory remained to support additional features, programming code was added to

implement the surprise random events. One of two such events may occur during a game: the deadline may be moved up or the budget may be decreased. The amount of the decrease (time or money available) is a randomly generated percentage of the amount the player has at the moment the event occurs.

Finally, the program was tested using a series of volunteers. The testing resulted in some fine tuning activity, enabling the game to run faster and more efficiently.

The final version of the program nearly filled the available 32K memory of the computer; approximately 300 bytes (storage locations) remain unused. When stored on disk the program requires 20,480 bytes, the data file uses an additional 38,400 bytes. These storage demands forced the game to be placed on a separate data diskette (i.e. the diskette does not contain a copy of the computer's disk operating system "TRSDOS").

The description presented in this section has purposely omitted the details of programming. Those wishing to replicate the project are referred to the documentation package available from The School of Natural Resources, The Ohio State University (see Appendix D).

CONCLUSION

The objective of this work was to develop a computer program to demonstrate to future interpreters the power and uses of computers for modeling and learning. Whether or not INTERP will encourage use of machines as electronic models and learning tools remains to be seen. Until the game is used and feedback is obtained, it is difficult to determine to what degree the objectives of this project were met. Even then, the subjective nature of what is to be measured may prevent satisfactory conclusions.

Feedback has been solicited. Positive reaction to the game has already been received. Two researchers are incorporating aspects of INTERP into their own programs, and several professionals have expressed interest in the game. Some requests for consultation have been received.

On the negative side, some reviewers have indicated that the model on which the game is based is inaccurate. Instead of balancing three components of interpretation, some individuals believe four components should be juggled: the organization, the site, the visitor, and the budget. Another suggestion was that the "organization" component should be subdivided into two components: public relations and money management. This feedback shows that the basic design of the game is sound, since INTERP could easily be modified to accomodate

all of the suggestions received. Also, the constructive criticism shows that ideas are already surfacing as to how the game could be improved. This thesis has the potential to serve as the introduction and inspiration it was meant to be and encourage the development of new and better projects in the future.

RECOMMENDATIONS FOR FUTURE PROJECTS

The intent is for INTERP to serve as the foundation for many other projects. Since this study is formative research, further work will undoubtedly yield significant discoveries and improvements. Some recommendations for future enhancements and ideas for new projects are presented in this section.

Some additions to INTERP suggest themselves immediately. Of these, perhaps the easiest to implement would be the addition of items to the computer's master list, thus increasing the randomness of the program. This enhancement would be particularly appreciated by veteran players who would, even after several games, still be able to investigate and learn about items they had never encountered before.

Additional randomness and interest could be added by including the possibility of more surprise situations in the game. For example, the player's imaginary supervisor could suddenly announce (by means of a special screen) that certain items were not to be included in the plan (e.g. the screen might read: "Your supervisor has decided that you may not include items 4, 9, and 17 in your interpretive plan.") The items selected, of course, could be randomly generated. Another idea along the same lines is that the priority of the items could be shuffled. Hence, what was once item #1 could become item #19. New items could even be introduced to replace existing ones.

Incorporation of a skill level factor is also worthy of consideration. Players could specify how difficult they wanted the game to be and watch their progress as they developed from "Staff Interpreter" to "Park Manager." The more advanced the skill level, the less time and money the player would have to work with and, perhaps, the more complex the items which would have to be considered. Some thought might be given to having the machine monitor the player's performance and automatically give "promotions" and correspondingly adjust the difficulty.

All of the ideas presented thus far could easily be included in the present version of INTERP. Many other ideas would require extensive modifications to the code or different hardware (a different computer and/or peripheral devices). One such recommendation would be to develop a game which would allow the player to choose the type of site for which he or she would be developing the plan. Interpretation can occur at a wide variety of diverse places, from a small one-room museum to a national park. Allowing the player to choose the site would introduce more variety into the game and increase its value as a learning tool. The site could be described in detail; the items on the main playing screen could be selected from a list specifically designed for the chosen site. Hence, the player would be placed in a more realistic situation and could learn how interpretive planning at various sites differs.

More realism could be obtained through modification of the way in which the results of studies are returned. Currently, the player can perform a "study" and be assured that what the computer says will happen is exactly what will happen. A degree of uncertainty could be introduced so that, just as in reality, the results of studies could not always be trusted. Better yet, the program could be changed so that the more time players chose to spend on studies, the more certain they could be of the results.

The studies could also be changed to provide pertinent information instead of directly revealing the various impacts. Thus, if a "visitor" study were initiated, the computer would return the number of people who attended the site daily, their ages and social group, the percentage which could be expected to make use of the item in question, the percentage which used wheelchairs, and so on. Using these data it would be up to the player to calculate the impacts for himself or herself. The information returned could vary randomly from game to game and/or depend on other variables such as the size and type of park with which the player was dealing.

Graphics terminals, video devices capable of displaying line drawings, pictures, and even photographs, open up a huge number of possibilities for future projects. Items could be displayed instead of described (it is one thing to read about a new interpretive center exhibit, quite another to examine a picture of the proposed addition!) Maps of the site could be presented on the screen, and players could be asked to pinpoint the locations of new roads, trails, and

interpretive facilities. Concepts of site planning could be incorporated into the game. Data could be presented using detailed graphs.

As future projects become more and more involved, much more interaction among the components of interpretation could start to occur. Decisions made early in the game could have certain ramifications at a later time. A new interpretive program may draw visitors from an existing one; one facility may make it impossible to construct another.

All of these improvements and enhancements have been presented with a goal in mind, and that goal is presented here as a challenge. Eventually, the workings of the computer programs will so closely resemble the actual workings of an interpretive environment that they will no longer be merely games but rather simulation tools. Interpretive planners will be able to experiment and will act only after seeing the ramifications of each of their choices. Roads will be paved and trails will be blazed without harming a single blade of grass, and then removed with the push of a button. Buildings will be constructed and torn down hundreds of different times until the best site is located.

This goal is by no means unrealistic, the technology necessary exists today. It can be achieved. It is up to tomorrow's interpreters to ensure that it is.

APPENDIX A
Introductory Screens

INTERP

A COMPUTER SIMULATION GAME OF
THE INTERPRETIVE PLANNING PROCESSPRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE MASTER OF SCIENCE

BY

JOHN L. MACKO

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SCHOOL OF NATURAL RESOURCES
THE OHIO STATE UNIVERSITY
1982

YOU ARE AN INTERPRETER WHO HAS BEEN ASSIGNED THE TASK OF WRITING A PLAN FOR THE SITE AT WHICH YOU WORK. YOU AND YOUR SUPERVISOR HAVE JUST MET AND, AFTER MUCH STUDY, SELECTED AND RANK ORDERED FROM THE SITE'S MASTER PLAN TWENTY ITEMS FOR WHICH YOU BELIEVE THE GREATEST NEED EXISTS, BASED ON CURRENT PRIORITIES AND COMMITMENTS. UNFORTUNATELY, A LIMITED BUDGET FOR THE COMING FISCAL PERIOD MAY PREVENT SOME OF THE ITEMS FROM BEING IMPLEMENTED. IN ADDITION, A DEADLINE HAS BEEN SET BY WHICH THE PLAN MUST BE COMPLETED. YOUR JOB IS TO WORK WITHIN THE CONSTRAINTS WITH WHICH YOU ARE FACED AND DRAW UP THE BEST POSSIBLE INTERPRETIVE PLAN.

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

INTERPRETATION INVOLVES THREE COMPONENTS: THE ORGANIZATION, THE SITE, AND THE VISITOR. THE INTERPRETIVE PLAN WHICH YOU ARE ABOUT TO CREATE MAY BE BIASED IN ONE OF THE FOUR WAYS LISTED BELOW. SELECT THE BIAS YOU INTEND TO PURSUE AND KEY THE APPROPRIATE LETTER ("B", "O", "S", OR "V").

- B -- THE PLAN WILL ATTEMPT TO BALANCE ITS EFFECTS AMONG THE THREE COMPONENTS OF INTERPRETATION
- O -- THE PLAN WILL ATTEMPT TO MAXIMIZE THE BENEFITS ACCRUED TO THE ORGANIZATION
- S -- THE PLAN WILL ATTEMPT TO MAXIMIZE THE BENEFITS ACCRUED TO THE SITE
- V -- THE PLAN WILL ATTEMPT TO MAXIMIZE THE BENEFITS ACCRUED TO THE VISITOR

ENTER "B", "O", "S", OR "V"

YOU ARE NOW FACED WITH THREE CONSTRAINTS WITHIN WHICH YOU MUST DESIGN YOUR INTERPRETIVE PLAN:

- BIAS: THE DECISIONS YOU MAKE MUST MAXIMIZE THE BENEFITS ACCRUED TO THE -----
- BUDGET: THE BUDGET FOR THE COMING FISCAL PERIOD IS \$ ----- . NOTE THAT THIS IS SIMPLY THE MAXIMUM AMOUNT WHICH, WHEN AND IF THE PLAN IS IMPLEMENTED, MAY BE SPENT. NONE OF THE FUNDS ARE AT YOUR DISPOSAL.
- DEADLINE: THE PLAN MUST BE COMPLETED IN -- WORKING DAYS (--- HOURS).

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

THIS GAME BEGINS WITH THE DISPLAY OF A "MAIN PLAYING SCREEN." THIS SCREEN WILL LIST TWENTY RANK-ORDERED ITEMS. YOUR JOB IS TO SELECT ITEMS FROM THIS LIST FOR INCLUSION IN THE PLAN YOU ARE TO BUILD. SINCE THE ITEMS ARE ORDERED FROM MOST IMPORTANT (#1) TO LEAST IMPORTANT (#20), YOU SHOULD CONCENTRATE ON IMPLEMENTING ITEMS AT THE BEGINNING OF THE LIST.

TO LEARN MORE ABOUT ANY ITEM ALL THAT YOU HAVE TO DO IS ENTER THE APPROPRIATE NUMBER. THE COMPUTER WILL PRESENT A DETAILED DESCRIPTION OF THE ITEM FOR YOU TO STUDY. AFTER YOU HAVE READ THIS DESCRIPTION, ALL OF THE VARIOUS OPTIONS YOU HAVE IN IMPLEMENTING THE ITEM WILL BE DISPLAYED.

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

ONCE YOU CONSIDER ALL THE WAYS TO IMPLEMENT AN ITEM, YOU MAY WISH TO INCLUDE IT IN YOUR INTERPRETIVE PLAN. THIS IS DONE BY KEYING THE LETTER ("A", "B", "C", "D" OR "E") ASSOCIATED WITH THE OPTION YOU SELECT. YOU MAY, HOWEVER, WANT MORE INFORMATION ABOUT EACH OPTION BEFORE YOU MAKE A DECISION. HENCE, YOU MAY ELECT TO SPEND SOME TIME TO PERFORM ONE OR MORE STUDIES. THESE STUDIES, INITIATED BY KEYING THE SYMBOLS "O", "S", "V" AND "\$", WILL SHOW THE IMPACT EACH OPTION WILL HAVE ON THE ORGANIZATION, THE SITE, AND THE VISITOR, AND THE COST OF EACH OPTION.

YOU MAY SIMPLY REVIEW AN ITEM AND CHOOSE NOT TO INCLUDE IT IN YOUR PLAN, OR YOU MAY RETURN TO IT AT A LATER TIME AND RECONSIDER IT. ONCE AN ITEM IS INCLUDED, HOWEVER, IT CANNOT BE WITHDRAWN, AND EACH ITEM MAY BE INCLUDED ONLY ONCE.

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

IF YOU PERFORM IMPACT STUDIES, THE RESULTS ARE RETURNED TO YOU
IN THE FOLLOWING NUMERICALLY CODED FORMAT:

- +3 = EXTREMELY BENEFICIAL TO THE COMPONENT IN QUESTION
- +2 = BENEFICIAL TO THE COMPONENT IN QUESTION
- +1 = SLIGHTLY BENEFICIAL TO THE COMPONENT IN QUESTION
- 0 = NO EFFECT ON THE COMPONENT IN QUESTION
- 1 = SLIGHTLY DETRIMENTAL TO THE COMPONENT IN QUESTION
- 2 = DETRIMENTAL TO THE COMPONENT IN QUESTION
- 3 = EXTREMELY DETRIMENTAL TO THE COMPONENT IN QUESTION

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

TO MONITOR THE BALANCE AMONG THE THREE COMPONENTS OF
INTERPRETATION YOU MAY REQUEST THE COMPUTER TO DISPLAY A SPECIAL
GRAPH. THIS GRAPH USES THE LETTERS "O", "S", AND "V" TO
DEPICT VISUALLY THE RELATIONSHIP OF THE THREE COMPONENTS TO ONE
ANOTHER. A VERTICAL LINE IN THE CENTER OF THE GRAPH INDICATES
THE POSITION OF BALANCE. THE LETTERS MOVE TO THE RIGHT OR LEFT
OF THE LINE AS DECISIONS ARE MADE TO INCLUDE ITEMS WHICH ARE
BENEFICIAL OR DETRIMENTAL TO EACH COMPONENT. TO DISPLAY THIS
GRAPH, KEY THE LETTER "G" ON EITHER THE MAIN PLAYING SCREEN OR
AN IMPLEMENTATION OPTION SCREEN. EXAMINATION OF THIS GRAPH
COSTS YOU NOTHING, SO YOU MAY WISH TO DISPLAY IT OFTEN.

WHEN YOUR INTERPRETIVE PLAN IS COMPLETE, KEY THE LETTER "Q"
("QUIT") TO END THE GAME AND RECEIVE AN EVALUATION OF YOUR PLAN.

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

THE NEXT SCREEN WILL ALLOW YOU TO BEGIN BUILDING YOUR INTERPRETIVE PLAN. THIS "MAIN PLAYING SCREEN" WILL PRESENT, IN RANK ORDER FROM MOST IMPORTANT TO LEAST IMPORTANT, THE TWENTY ITEMS WHICH YOU AND YOUR SUPERVISOR HAVE SELECTED FROM THE SITE'S MASTER PLAN. IT WILL ALSO PRESENT A CONTINUOUS SUMMARY OF YOUR USE OF TIME AND THE ALLOTTED BUDGET.

TO EXAMINE ANY ITEM IN DETAIL, SIMPLY ENTER THE NUMBER IN FRONT OF THE ITEM. (SINGLE DIGIT NUMBERS MUST BE ENTERED WITH A LEADING ZERO, E.G. IF YOU WANT TO SEE ITEM NUMBER FOUR YOU MUST KEY "04".)

GOOD LUCK!

PRESS THE <SPACE BAR> TO DISPLAY THE NEXT SCREEN

APPENDIX B

Sample Survey Packet Including Cover Letter and Typical Questionnaire

28 June 1982

Dear Participant:

Thank you for agreeing to assist with this project!

Currently under development in the School of Natural Resources at The Ohio State University is a computer simulation game. This program, named INTERP, is based on the interpretive planning process and is being written as a master's thesis project. It is planned that the game will be used by future students as a learning tool. In order to make the simulation as close to reality as possible your expertise and help are being solicited.

The game will present the player with a number of items which he or she may choose to include in an interpretive plan for an imaginary site. Each item will have from two to five options associated with it. In addition to such concerns as budget and time limitations, the player will have to be aware of the effect each choice will have on the three components of interpretation: the site (the resource base), the organization (the management agency which sponsors the interpretive programs in the park), and the visitor.

Attached to this letter you will find a description of ten of the items which may be presented to a player during a session of INTERP. Beneath each description are the options for implementation of the item, and next to each option you will find three boxes which correspond to the organization, the site, and the visitor. Your task is to evaluate the impact each option will have on each of the three components of interpretation by placing a numerical value in the appropriate box. The scale for the impact values ranges from -3 to +3 representing impacts from extremely detrimental (-3) to extremely beneficial (+3). A key to the scale is reproduced on each page.

You may find yourself wanting more information about an item before you evaluate it. The descriptions were kept brief due to the design of the game and the limitations of the computer on which it is being written. The information you have is exactly the same as that which will be presented to the player. Please make your judgements based on the description presented, drawing from your past experience, intuition, and expertise.

Feel free to make any suggestions, comments, or corrections that you care to on the attached pages, but please do not feel obliged to do so. All that is required is that the impact values be entered in the boxes.

A completed item has been included as an example. Again, even though the sample page has a few explanations jotted down, do not feel obligated to do this.

If possible, could you complete this exercise by 16 July 1982? The packet may be returned to either of us, or you may contact John and he will arrange to pick the materials up.

The program should be complete by the end of July. If you are interested, we will send you materials on the program when it is finished.

Thanks again for your help on this project.

Sincerely,

John L. Macko
Graduate Researcher

Gary W. Mullins, Ph.D.
Assistant Professor

P.S. Please do not hesitate to contact either of us if you have any questions or problems. John Macko may be reached at 421-6940 x.3401 (office) or 457-4258 (home), Gary Mullins at 422-5589 (office) or 888-5387 (home).

Brief Description of Game

Since INTERP is a simulation game it is set in a scenario. The player is an interpreter who has just been given the task of writing an interpretive plan for a site. The interpreter (player) and his or her supervisor have met and, after much study, selected twenty items from the site's master plan for which the greatest need currently exists. Unfortunately, a limited budget for the coming fiscal period prevents all of the items from being implemented. The player's job is to draw up a plan which includes as many items as possible. As an additional constraint, a deadline is set by which the plan must be completed.

Along with monitoring the budget and time limitations, the player has to be aware of the effect each choice has on the three components of interpretation: the site, the organization, and the visitor. The player may choose to balance the effects on the three components, or may opt to maximize the benefits accrued to one of the entities.

When the game is run the first thing that appears is a number of introductory screens which set the stage by describing the scenario and explaining how the game is played. The actual game begins when the computer formats the main playing screen. The heading at the top of this screen always presents a current summary of the player's use of time and money. Under the heading are several numbered lines of text. Each line very briefly describes one item which the player may include in the interpretive plan which is to be built. It is the player's job to create a plan by selecting items from the main playing screen.

In order to learn more about any item on the main playing screen, the player must type in the item's corresponding number. After a selection is made, new screens come up which describe the item in more detail and display the different ways in which the item may be implemented. After examining the information presented for a particular item, the player may wish to implement one of the options presented. Chances are good, however, particularly for the novice player, that more information will be needed before an intelligent decision can be made. To obtain this additional information, the player may request the computer to perform "studies". These studies, roughly equivalent to such investigations as visitor surveys, cost/benefit analyses, and environmental impact studies, will inform the player as to the effects each decision will have.

After examining several items and reviewing the results of as many "studies" as necessary, the the player eventually builds the interpretive plan. The game is won if the plan constructed influences the three components of interpretation as predicted. A score is displayed reflecting the player's performance.

Each session of the game will be different (over 73 septillion different games are possible) due to the fact that the machine will randomly generate the player's budget, time deadline, and the items which may be included in the interpretive plan. In addition, random events may occur to surprise even the veteran player. For example, the budget may suddenly and without warning be slashed!

It is hoped that this game will contribute toward the marriage between Environmental Interpretation and Computer Science. Hopefully its example will encourage tomorrow's interpreters to investigate uses of the computer for learning, prediction, and control.

Item #1

NATURE TRAIL

A NEW NATURE TRAIL IS NEEDED IN AN AREA IN CLOSE PROXIMITY TO THE VISITOR CENTER. THIS TRAIL'S INTENDED USE WILL BE FOR DAY HIKES AND CONDUCTED TOURS. IT WILL NOT BE SELF-GUIDING. IT WILL BE ONE-HALF MILE LONG, AN AVERAGE OF 6 FEET WIDE, AND FAIRLY LEVEL THROUGHOUT WITH A MAXIMUM GRADE OF 8 PERCENT. OPTIONS TO BE CONSIDERED INVOLVE THE MATERIAL TO BE USED FOR THE TRAIL SURFACE (SOIL AND LEAF LITTER, WOOD CHIPS, OR PAVED WITH ASPHALT) AND WHETHER OR NOT REDUNDANT TRAILS SHOULD BE CONSTRUCTED. THE USE OF REDUNDANT TRAILS WOULD BE ALTERNATED, ALLOWING TIME FOR PORTIONS OF THE AREA TO "REST." (NOTE--ROUGHLY 7% OF THE VISITORS TO THE SITE HAVE NEED OF WHEELCHAIRS.)

IMPLEMENTATION OPTIONS:

- A) AN UNPAVED TRAIL (SOIL AND LEAF LITTER SURFACE)
- B) REDUNDANT UNPAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)
- C) A TRAIL WITH A WOOD CHIP SURFACE
- D) A PAVED TRAIL (SURFACED WITH ASPHALT)
- E) REDUNDANT PAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)

O	S	V

Key:

- O → Organization
- S → Site
- V → Visitor
- +3 → The option would be extremely beneficial to the component in question
- +2 → The option would be beneficial to the component in question
- +1 → The option would be slightly beneficial to the component in question
- 0 → The option would have virtually no effect on the component in question
- 1 → The option would be slightly detrimental to the component in question
- 2 → The option would be detrimental to the component in question
- 3 → The option would be extremely detrimental to the component in question

APPENDIX C

The Thirty Items and Associated Data

ITEM #1: NATURE TRAIL

A NEW NATURE TRAIL IS NEEDED IN AN AREA IN CLOSE PROXIMITY TO THE VISITOR CENTER. THIS TRAIL'S INTENDED USE WILL BE FOR DAY HIKES AND CONDUCTED TOURS. IT WILL NOT BE SELF-GUIDING. IT WILL BE ONE-HALF MILE LONG, AN AVERAGE OF 6 FEET WIDE, AND FAIRLY LEVEL THROUGHOUT WITH A MAXIMUM GRADE OF 8 PERCENT. OPTIONS TO BE CONSIDERED INVOLVE THE MATERIAL TO BE USED FOR THE TRAIL SURFACE (SOIL AND LEAF LITTER, WOOD CHIPS, OR PAVED WITH ASPHALT) AND WHETHER OR NOT REDUNDANT TRAILS SHOULD BE CONSTRUCTED. THE USE OF REDUNDANT TRAILS WOULD BE ALTERNATED, ALLOWING TIME FOR PORTIONS OF THE AREA TO "REST." (NOTE--ROUGHLY 7% OF THE VISITORS TO THE SITE HAVE NEED OF WHEELCHAIRS.)

IMPLEMENTATION OPTIONS:				O	S	V	\$
A) AN UNPAVED TRAIL (SOIL AND LEAF LITTER SURFACE)				0	-1	-1	\$21000
B) REDUNDANT UNPAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)				1	0	0	\$42000
C) A TRAIL WITH A WOOD CHIP SURFACE				0	-1	1	\$49000
D) A PAVED TRAIL (SURFACED WITH ASPHALT)				1	-1	2	\$34300
E) REDUNDANT PAVED TRAILS (USE OF THE TRAILS WILL BE ALTERNATED)				-2	-2	0	\$68640
Minimum time required for study:				8	30	16	4
Maximum time required for study:				16	70	40	28

Survey Results:

Organization	Site	Visitor
A) 0,-1,-2,+3, 0 = 0	-2,-3,-2,-1,+3 = -1	-3,-2,-2,-2,+3 = -1
B) 0,+1,+2,-2,+1 = 0	-1,-2,-1, ?,+2 = -1	+1,-1,+2,-1,+2 = +1
C) -1,+2, ?, ?,+2 = +1	-1,-1, ?,+2, 0 = 0	-1,-1, ?,+2,+1 = 0
D) +2,+3,+1,+1,-1 = +1	-1,+3,-3,-2,-2 = -1	+2,+3,+1,+2,+1 = +2
E) +1,-2,-3, ?, -3 = -2	-1,-1,-3,-3,-3 = -2	+2,+1, 0,+2,-3 = 0

Question Marks ("?") indicate items not completed by the respondent.

ITEM #2: SLIDE PROJECTION SYSTEM

THIRTY-FIVE MILLIMETER SLIDE PROJECTION EQUIPMENT IS NEEDED FOR AN EXISTING AMPHITHEATER WHICH IS CURRENTLY USED FOR LIVE PRESENTATIONS AND MOTION PICTURES. THE EQUIPMENT WILL ALSO BE USED FOR OFF-SITE INTERPRETATION. CHOICES TO BE MADE INCLUDE THE NUMBER OF BACKUP PROJECTORS TO BE PURCHASED AND WHETHER OR NOT A DISSOLVE CONTROL IS TO BE OBTAINED. A DISSOLVE CONTROL IS A DEVICE ALLOWING MULTIPLE IMAGES FROM DIFFERENT PROJECTORS TO BE PHASED IN AND OUT ON A SINGLE SCREEN, PROVIDING THE CAPABILITY NOT ONLY FOR PROJECTED IMAGES TO DISSOLVE INTO ONE ANOTHER, BUT ALSO SUCH EFFECTS AS ANIMATION, TITLING, AND HIGHLIGHTING OF IMPORTANT FEATURES.

<u>IMPLEMENTATION OPTIONS:</u>				
	<u>O</u>	<u>S</u>	<u>V</u>	<u>\$</u>
A) A SINGLE PROJECTOR	-1	-1	1	\$205
B) TWO PROJECTORS (ONE TO BE USED FOR BACKUP)	1	0	1	\$410
C) TWO PROJECTORS AND A DISSOLVE CONTROL	2	0	2	\$600
D) THREE PROJECTORS AND A DISSOLVE CONTROL (ONE PROJECTOR BACKUP)	2	0	2	\$805
E) FOUR PROJECTORS AND A DISSOLVE CONTROL (TWO PROJECTOR BACKUP)	2	0	2	\$1010

Minimum time required for study:	4	1	16	2
Maximum time required for study:	12	4	40	8

Survey Results:

<u>Organization</u>	<u>Site</u>	<u>Visitor</u>
A) +1,-2,+1,-1,-2 = -1	0, 0, 0, 0,-3 = -1	+1,-2,+1,+1,+3 = +1
B) +1,-1,+2,+1,+1 = +1	0, 0, 0, 0,-2 = 0	+1,+1,+1,+2,+1 = +1
C) +2,+1,+2,+2,+3 = +2	0, 0, 0, 0, 0 = 0	+2,+2,+2,+3, 0 = +2
D) +3,+2,+3,+1,+2 = +2	0, 0, 0, 0,+1 = 0	+2,+2,+2,+2, 0 = +2
E) +2,+3,+1,-1,+3 = +2	0, 0, 0, 0,+2 = 0	+2,+3,+2,+1, 0 = +2

ITEM #3: SELF-GUIDING TRAIL

AN EXISTING TRAIL IS TO BE CONVERTED TO A SELF-GUIDING TRAIL. THE PHYSICAL REQUIREMENTS OF THE HALF-MILE LOOP ARE ALREADY ADEQUATE; NO FURTHER TRAIL CONSTRUCTION IS NEEDED. INTERPRETATION MUST BE ADDED TO CREATE A SELF-GUIDING TRAIL CONSISTING OF TWENTY STATIONS. THIS INTERPRETATION MAY TAKE THE FORM OF LEAFLETS KEYED TO MARKERS, SIGNS IN PLACE, OR AUDIO DEVICES. IF LEAFLETS ARE USED, IT MUST BE DECIDED HOW THEY ARE TO BE DISTRIBUTED (E.G. DOES THE VISITOR HAVE THE OPTION OF PURCHASING THE LEAFLET? OR IS IT EXPECTED TO BE RETURNED AT THE TRAIL'S END?)

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) LEAFLETS WHICH ARE EXPECTED TO BE RETURNED BY THE VISITOR	1	0	0	\$510
B) LEAFLETS WHICH MUST BE PURCHASED BY THE VISITOR	1	0	0	\$100
C) LEAFLETS WHICH MAY BE PURCHASED BY THE VISITOR OR RETURNED	1	0	2	\$305
D) FIXED SIGNS IN PLACE ALONG THE TRAIL AT THE SELECTED STATIONS	0	-1	1	\$400
E) FIXED LISTENING STATIONS ALONG THE TRAIL (A "TALKING LABEL" TRAIL)	-2	-1	0	\$9000

Minimum time required for study:	4	12	16	1
Maximum time required for study:	8	28	32	17

Survey Results:

	Organization	Site	Visitor
A)	-1,+2,+1,+2,-1 = +1	-1,-1,-1,+2,-1 = 0	+1, 0,+1,+1,-1 = 0
B)	+2,+1,+1,+2,-2 = +1	-1,-1,-1,+2,+1 = 0	-2,-1, ?,+1,+2 = 0
C)	+3,+2,+2,+1,-2 = +1	-1,-1,-1,+2,-1 = 0	+1,+1,+2,+2,+2 = +2
D)	-1,+3,+1,+1,-2 = 0	-2,-1,-1,-1,-2 = -1	+2,+2,+1,-1,+2 = +1
E)	-2,-2,+1,-2,-3 = -2	-2,-1,-1,-1,-2 = -1	+2,+1,-1,-1,+1 = 0

Question Marks ("?) indicate items not completed by the respondent.

ITEM #4: SKY INTERPRETATION

A SKY INTERPRETATION PROGRAM DEVELOPED DURING THE PAST YEAR HAS BECOME QUITE POPULAR AND CONSISTENTLY ATTRACTS LARGE NUMBERS OF VISITORS. THE POSSIBILITY OF ENHANCING THIS PROGRAM THROUGH THE PURCHASE OF A TELESCOPE HAS RECENTLY BEEN DISCUSSED. THREE TELESCOPES ARE UNDER CONSIDERATION. ONE IS A SMALL, VERY RUGGED UNIT WHICH IS EASY TO USE AND CAN BE TAKEN ALMOST ANYWHERE. THE OTHER TWO TELESCOPES REQUIRE MORE TIME AND EXPERTISE TO SET UP AND USE BUT ARE CONSIDERABLY MORE POWERFUL. ALSO, THE THREE UNITS DIFFER IN THE DIAMETERS OF THEIR PRIMARY MIRRORS. IN GENERAL, THE LARGER A TELESCOPE'S MIRROR, THE BETTER ITS LIGHT GATHERING CAPABILITIES.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) SMALL, RUGGED, EASY-TO-USE TELESCOPE, 4.125 INCH (105 MM) DIAMETER MIRROR	1	0	2	\$230
B) LARGER TELESCOPE, 6 INCH (152 MM) DIAMETER MIRROR	0	0	2	\$480
C) "TOP OF THE LINE" TELESCOPE, 8 INCH (203 MM) DIAMETER MIRROR	0	0	2	\$900
Minimum time required for study:	4	1	12	4
Maximum time required for study:	8	3	24	12

Survey Results:

	Organization	Site	Visitor
A)	+2,+3,+2,+3,-3 = +1	0, 0, 0, 0, 0 = 0	+1,+3,+3,+3,+1 = +2
B)	-1,+2,+1,+2,-3 = 0	0, 0, 0, 0, 0 = 0	+2,+2,+2,+2,+2 = +2
C)	-2,+1,+2,+1,-3 = 0	0, 0, 0, 0, 0 = 0	+3,+1,+1,+2,+3 = +2

ITEM #5: COMPUTER SYSTEM

A SMALL COMPUTER SYSTEM WOULD BE HELPFUL TO THE ORGANIZATION IN SUCH TASKS AS MANIPULATION OF THE BUDGET, DESIGN OF SCHEDULES, PREDICTION OF VISITOR ATTENDANCE, MAINTENANCE OF MAILING LISTS, STORAGE AND RETRIEVAL OF INFORMATION (E.G. AT A VISITOR INFORMATION DESK), SERVING AS AN INTERACTIVE SIMULATION EXHIBIT, AND A WEALTH OF OTHER AREAS. TWO ITEMS ARE OF PRIMARY CONCERN TO YOU IN THE PURCHASE OF THIS SYSTEM: THE AMOUNT OF MEMORY ON THE MACHINE AND THE NUMBER OF DISK DRIVES TO BE OBTAINED. IN GENERAL, THE MORE MEMORY AVAILABLE, THE MORE SOPHISTICATED THE PROGRAMS WHICH MAY BE RUN, AND THE MORE DISK UNITS, THE LARGER THE AMOUNT OF INFORMATION WHICH MAY BE STORED.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) A COMPUTER WITH A SMALL AMOUNT OF MEMORY (16K) AND ONE DISK DRIVE	2	1	1	\$1780
B) A COMPUTER WITH A SMALL AMOUNT OF MEMORY (16K) AND TWO DISK DRIVES	2	1	1	\$2255
C) A COMPUTER WITH A LARGER AMOUNT OF MEMORY (32K) AND TWO DISK DRIVES	3	1	3	\$2335
D) A COMPUTER WITH A LARGER AMOUNT OF MEMORY (32K) AND FOUR DISK DRIVES	2	1	2	\$3390
E) A COMPUTER WITH EVEN MORE MEMORY (48K) AND FOUR DISK DRIVES	2	1	2	\$3480

Minimum time required for study:	16	1	4	8
Maximum time required for study:	24	4	8	16

Survey Results:

	Organization	Site	Visitor
A)	+2,+1, ?,+2,+1 = +2	+1, 0, ?,+1,+1 = +1	+1, ?, ?,+1,+1 = +1
B)	+2,+1, ?,+2,+1 = +2	+1, 0, ?,+2,+1 = +1	+1, ?, ?,+2,+1 = +1
C)	+2,+3, ?,+3,+2 = +3	+1, 0, ?,+2,+1 = +1	+3, ?, ?,+3,+2 = +3
D)	+3,+2, ?,+1,+2 = +2	+1, 0, ?,+1,+2 = +1	+3, ?, ?,+1,+2 = +2
E)	+3,+1, ?,+1,+3 = +2	+1, 0, ?,+1,+3 = +1	+3, ?, ?,+1,+3 = +2

Question Marks ("?") indicate items not completed by the respondent.

ITEM #6: WAYSIDE SIGN

AN INTERPRETIVE SIGN IS DESIRED AT A REMOTE LOCATION. THE TEXT AND GRAPHICS FOR THE SIGN HAVE ALREADY BEEN DESIGNED, AND THE HARDWARE FOR MOUNTING THE SIGN ON AN EXISTING WOODEN FENCE POST HAS ALREADY BEEN OBTAINED. YOUR JOB IS TO DETERMINE THE MATERIAL TO BE USED FOR THE SIGN: METAL, WOOD, PLASTIC, OR PAPER.

IMPLEMENTATION OPTIONS:

	O	S	V	\$
A) A METAL SIGN (PRODUCED VIA A PRINTING PROCESS ON ANODIZED ALUMINUM)	0	-1	2	\$100
B) A METAL SIGN WITH PAINTED TEXT AND ARTWORK	0	-1	2	\$200
C) A RUSTIC WOODEN SIGN (ROUTED LETTERS AND LINE DRAWINGS)	-1	1	1	\$75
D) A PLASTIC SILKSCREENED SIGN COVERED WITH CLEAR PROTECTIVE PLASTIC	1	0	1	\$200
E) LAMINATED PAPER	-2	-1	-1	\$5

Minimum time required for study:	1	3	6	8
Maximum time required for study:	5	5	14	24

Survey Results:

Organization	Site	Visitor
A) +2,-2,+1,-2,+3 = 0	-2,-1, 0,+2,-3 = -1	+2,+1,+1,+3,+3 = +2
B) +1,-3,+1,-2,+2 = 0	-2,-1, 0,+2,-2 = -1	+2,+1,+1,+3,+2 = +2
C) -1,-2, ?,+2,-1 = -1	-1,+2, 0,+2,+3 = +1	+2,+2, ?,+2,-1 = +1
D) -2,+3,+2,+2,-2 = +1	-1,-1, 0,+2,-2 = 0	+1,+1,+2,+3,-2 = +1
E) -3,+1,-2,-2,-3 = -2	-1,-1, 0,-2,-3 = -1	+1,+1,-2,-1,-3 = -1

Question Marks ("?) indicate items not completed by the respondent.

ITEM #7: INFORMATION HANDOUT

VISITORS COULD BENEFIT FROM A HANDOUT CONTAINING SUCH INFORMATION AS ANSWERS TO COMMONLY ASKED QUESTIONS, LISTS OF THINGS TO SEE AND DO, SCHEDULES OF INTERPRETIVE PROGRAMS, AND THE RULES AND REGULATIONS OF THE SITE. THE HANDOUT IS TO BE DISTRIBUTED FREE OF CHARGE. YOU MAY CHOOSE TO PRESENT THE INFORMATION AS EITHER A SINGLE SHEET OF PAPER OR AS A SMALL BOOKLET OR BROCHURE. YOU MUST ALSO DECIDE ON THE REPRODUCTION METHOD TO BE USED: WHETHER THE HANDOUT IS TO BE MIMEOGRAPHED, PHOTOCOPIED, OR PRINTED. FIFTEEN HUNDRED COPIES ARE TO BE PRODUCED.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) A MIMEOGRAPHED INFORMATION SHEET	0	-1	1	\$25
B) A PHOTOCOPIED INFORMATION SHEET	0	-1	2	\$75
C) PHOTOCOPIED PAGES ASSEMBLED INTO A SMALL BOOKLET	-1	0	2	\$150
D) AN INFORMATION SHEET PRODUCED VIA OFFSET PRINTING	0	-1	2	\$143
E) A BROCHURE (ONE PAGE, FOLDED) PRODUCED VIA OFFSET PRINTING	0	0	2	\$143
Minimum time required for study:	8	4	12	3
Maximum time required for study:	16	8	16	6

Survey Results:

	Organization	Site	Visitor
A)	-1,+3,-2,-2,+3 = 0	-2, 0,-1,-2,-2 = -1	+1,+2, 0,-2,+3 = +1
B)	-1,+2,-2,+1,+1 = 0	-2, 0,-1,-1,-2 = -1	+1,+3,+2,+1,+3 = +2
C)	-2,+1,-3,+2,-2 = -1	-1, 0,-1,+2,-1 = 0	+2,+1,+2,+2,+3 = +2
D)	-1,+2,+2,+1,-2 = 0	-2, 0,-1,+1,-2 = -1	+1,+2,+2,+2,+3 = +2
E)	-2,-1,+3,+3,-3 = 0	+1, 0,-1,+2,-1 = 0	+2,+1,+3,+3,+3 = +2

ITEM #8: SLIDE PRESENTATION

APPROXIMATELY 150 SLIDES ARE NEEDED FOR A SERIES OF PRESENTATIONS. THE SLIDES WILL ILLUSTRATE ACTIVITIES AVAILABLE AT THE SITE WITH PARTICULAR EMPHASIS ON UNIQUE OFFERINGS. THE PRESENTATIONS WILL BE USED AS PART OF AN ORIENTATION PROGRAM FOR NEW VISITORS AND WILL ALSO BE USED OFF-SITE AS AN INFORMATION TOOL AND TO ENCOURAGE VISITATION. ONE OF YOUR COLLEAGUES IS A REASONABLY PROFICIENT AMATEUR PHOTOGRAPHER WHO HAS VOLUNTEERED TO TAKE THE SLIDES FOR THE COST OF THE FILM AND PROCESSING. YOU MAY, ON THE OTHER HAND, ELECT TO HIRE A PROFESSIONAL. IT IS ASSUMED THAT THE SLIDES TAKEN BY YOUR COLLEAGUE WILL BE ADEQUATE BUT NOT NEARLY OF PROFESSIONAL QUALITY.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) HAVE THE SLIDES TAKEN BY YOUR COLLEAGUE (AN AMATEUR PHOTOGRAPHER)	1	1	2	\$136
B) HIRE A PROFESSIONAL PHOTOGRAPHER TO TAKE THE SLIDES	1	1	3	\$230
Minimum time required for study:	12	1	16	2
Maximum time required for study:	28	5	32	6

Survey Results:

	Organization	Site	Visitor
A)	-2,+3, ?,+1,+3 = +1	+1, 0, 0, 0,+3 = +1	+2,+2,+2,+2,+3 = +2
B)	-3,+2, ?,+2,+3 = +1	+2, 0, 0,+1,+3 = +1	+3,+3,+3,+3,+3 = +3

Question Marks ("?") indicate items not completed by the respondent.

ITEM #9: PROTECTION OF OVERUSED AREA

A PATH THROUGH A FAIRLY FRAGILE AREA CONSISTENTLY RECEIVES HEAVY VISITATION AND THE OVERUSE IS BEGINNING TO TAKE ITS TOLL. IT WOULD BE DESIRABLE TO ELIMINATE OR LIMIT USE OF THE AREA IN ORDER TO PREVENT FURTHER DAMAGE AND ALLOW THE TRAILSIDE ENVIRONMENT TO RECUPERATE. IF YOU DECIDE TO TAKE ACTION ON THIS ITEM, YOU MUST CHOOSE HOW TO LIMIT VISITOR USE OF THE AREA: THE PATH COULD EITHER BE CLOSED COMPLETELY OR OPEN ONLY AT CERTAIN TIMES OR FOR SPECIAL SCHEDULED EVENTS.

IMPLEMENTATION OPTIONS:

	O	S	V	\$
A) CLOSE THE TRAIL (COMPLETELY ELIMINATE VISITOR USE OF THE AREA)	0	3	-3	\$0
B) OPEN THE TRAIL FOR ONLY ONE AFTERNOON PER WEEK	-1	0	-1	\$0
C) ALLOW USE OF THE TRAIL ONLY DURING SPECIAL SCHEDULED HIKES	0	1	-1	\$0

Minimum time required for study:	24	16	16	1
Maximum time required for study:	40	32	32	2

Survey Results:

	Organization	Site	Visitor
A)	+1,-2,-2,-1,+2 = 0	+3,+3,+3,+3,+3 = +3	-3,-3,-3,-2,-3 = -3
B)	-2,-1,-1,+1,-2 = -1	+2,+1,+2,-1,-2 = 0	-1,-1,-1,-1,-3 = -1
C)	-2,+1,+2,+2,-3 = 0	+2,+2, ?,+3,-2 = +1	-2,-2,+1,+2,-3 = -1

Question Marks ("?) indicate items not completed by the respondent.

ITEM #10: INTERPRETIVE CENTER EXHIBIT

A NEW EXHIBIT FOR THE SITE'S INTERPRETIVE CENTER IS DESIRED TO HELP VISITORS IDENTIFY COMMON WILDFLOWERS. IT IS PLANNED THAT THE EXHIBIT WILL BE ON DISPLAY ONLY AT THOSE TIMES OF THE YEAR DURING WHICH THE WILDFLOWERS ILLUSTRATED ARE IN BLOOM. A TWO-DIMENSIONAL (FLAT-WORK) EXHIBIT IS ENVISIONED IN ORDER TO FACILITATE STORAGE, COMPLEMENT EXISTING EXHIBITS, AND MAKE OPTIMAL USE OF SPACE. THE OPTIONS UNDER CONSIDERATION ARE A) PHOTOGRAPHS WITH DESCRIPTIVE TEXT, B) A QUIZBOARD ALLOWING VISITORS TO MATCH PHOTOGRAPHS WITH DESCRIPTIONS VIA BUTTONS AND LIGHTS, AND C) AN AUDIO DEVICE LINKED WITH LARGE TRANSPARENCIES WHICH WILL LIGHT EACH PHOTOGRAPH IN TURN AS IT IS DESCRIBED.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) PHOTOGRAPHS WITH ACCOMPANYING DESCRIPTIVE TEXT	1	1	1	\$200
B) QUIZBOARD	1	1	3	\$350
C) AUDIO DEVICE LINKED WITH TRANSPARENCIES	0	0	2	\$700

Minimum time required for study:	8	1	3	20
Maximum time required for study:	16	4	7	36

Survey Results:

Organization	Site	Visitor
A) +1, 0, +2, +1, +3 = +1	0, 0, 0, +2, +3 = +1	+1, 0, +2, +1, +1 = +1
B) -1, +3, +2, +2, -1 = +1	0, 0, 0, +3, +3 = +1	+1, +3, ?, +3, +3 = +3
C) -2, +2, +2, +2, -2 = 0	0, -1, 0, -1, +3 = 0	+2, +2, +1, +2, +2 = +2

Question Marks ("?") indicate items not completed by the respondent.

ITEM #11: PUBLIC ADDRESS SYSTEM

A NEW PUBLIC ADDRESS SYSTEM IN AN EXISTING OUTDOOR AMPHITHEATER WOULD BE DESIRABLE TO HAVE. OF COURSE, THE SIMPLEST "PUBLIC ADDRESS" SYSTEM IS A HAND-HELD MEGAPHONE. ANOTHER OPTION WOULD BE TO PURCHASE A SMALL, PORTABLE ELECTRONIC UNIT WHICH COULD SIT ON TOP OF THE LECTERN. NOTE THAT THE TWO DEVICES MENTIONED ABOVE COULD BE USED AT OTHER LOCATIONS INCLUDING OFF-SITE. THE FINAL OPTION WOULD BE TO INSTALL A PERMANENT SYSTEM WITH ITS SPEAKERS AND AMPLIFICATION EQUIPMENT HOUSED IN SUCH A WAY AS TO WITHSTAND A REASONABLE AMOUNT OF DAMAGE FROM WEATHER, THEFT, AND VANDALISM. THE PERMANENT INSTALLATION WOULD PROVIDE SIGNIFICANTLY BETTER SOUND QUALITY THAN EITHER OF THE OTHER TWO OPTIONS.

IMPLEMENTATION OPTIONS:

	<u>O</u>	<u>S</u>	<u>V</u>	<u>\$</u>
A) MEGAPHONE	0	-1	1	\$7
B) PORTABLE PUBLIC ADDRESS SYSTEM	2	0	2	\$300
C) PERMANENT PUBLIC ADDRESS SYSTEM	3	1	2	\$1243
Minimum time required for study:	4	4	2	8
Maximum time required for study:	10	9	6	18

Survey Results:

	<u>Organization</u>	<u>Site</u>	<u>Visitor</u>
A)	-1,+2,-1,+1,+1 = 0	0,-1,-2, 0, 0 = -1	+1,+2,-1,+1,+1 = +1
B)	+1,+2,+1,+2,+3 = +2	+2,-1,-1, 0,+1 = 0	+2,+2,+1,+2,+2 = +2
C)	+3,+3,+2,+3,+2 = +3	+3,-1,-1, 0,+2 = +1	+3,+2,+1,+3,+3 = +2

ITEM #12: SITE DAMAGE PREVENTION

A NATURALLY VEGETATED AREA OF THE SITE LOCATED BETWEEN A PARKING LOT AND A PICNIC AREA IS BEING RUINED AS INCREASING NUMBERS OF VISITORS CUT ACROSS IT. STEPS SHOULD BE TAKEN TO PREVENT FURTHER DAMAGE. A PERMANENT TRAIL COULD BE CONSTRUCTED--THE TRAIL WOULD HAVE A SOIL SURFACE AND WOULD BE ABOUT TWO HUNDRED FEET LONG. ALTERNATIVELY, THREE INTERPRETIVE SIGNS COULD BE ERECTED EXPLAINING THE NECESSITY OF AVOIDING THE AREA. ANOTHER OPTION WOULD BE TO USE ONE HUNDRED FEET OF WOODEN FENCING TO KEEP VISITORS OUT. IF CHOSEN, THE FENCE WOULD HAVE TO BLEND WELL WITH THE EXISTING STRUCTURES AND ENVIRONMENT. FINALLY, LANDSCAPING COULD BE USED TO REROUTE THE VISITORS.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) CONSTRUCT A PERMANENT PATH THROUGH THE AREA	0	-2	1	\$1400
B) INSTALL THREE INTERPRETIVE SIGNS ASKING VISITORS NOT TO USE THE AREA	0	-1	0	\$120
C) ERECT ONE HUNDRED FEET OF WOODEN FENCING	1	0	0	\$198
D) USE LANDSCAPING TO REROUTE THE VISITORS	2	1	2	\$700

Minimum time required for study:	16	16	10	16
Maximum time required for study:	24	48	26	24

Survey Results:

	Organization	Site	Visitor
A)	-1,+2,-1,+1,-2 = 0	-2,-1,-2,-2,-3 = -2	+1,+2,+1,+1, 0 = +1
B)	+1,+2,-2,+1, 0 = 0	-1, 0,-2,-1,-1 = -1	+1,+2,-2, 0, 0 = 0
C)	-1,+1,+1,+2,+2 = +1	-1,-1,+1,+1,+1 = 0	0,+1,+1,-1,+1 = 0
D)	+1,+1,+2,+3,+3 = +2	+2, 0,+2,-2,+3 = +1	+1,+2,+2,+2,+2 = +2

ITEM #13: VISITOR ORIENTATION AID

AN ORIENTATION AID IS NEEDED IN THE VISITOR CENTER TO ANSWER QUESTIONS (SUCH AS LOCATION OF FEATURES) AND HELP VISITORS TO PLAN ACTIVITIES. THIS AID CAN TAKE MANY FORMS: A SIMPLE MAP HUNG ON A WALL, A TOPOGRAPHIC RELIEF MODEL RESTING HORIZONTALLY ON A STAND IN THE LOBBY, OR A SOPHISTICATED COMPUTER INFORMATION SYSTEM WITH A "TOUCH SCREEN" (QUESTIONS APPEARING ON A MENU SCREEN WOULD BE ANSWERED WHEN VISITORS TOUCHED THEM, THE PROCESS COULD BE REPEATED UNTIL EACH VISITOR HAD ALL THE INFORMATION THAT HE OR SHE NEEDED). IF THE MAP OR TOPOGRAPHIC MODEL IS SELECTED, YOU MAY CONSIDER INSTALLING PUSH BUTTONS WHICH WOULD LIGHT POINTS OF INTEREST.

IMPLEMENTATION OPTIONS:

	<u>O</u>	<u>S</u>	<u>V</u>	<u>\$</u>
A) MAP HUNG ON A WALL	1	0	1	\$90
B) MAP HUNG ON A WALL WITH PUSH BUTTONS TO LIGHT POINTS OF INTEREST	1	1	2	\$190
C) TOPOGRAPHIC RELIEF MODEL RESTING ON A STAND IN THE LOBBY	1	1	1	\$500
D) TOPOGRAPHIC RELIEF MODEL WITH PUSH BUTTONS TO LIGHT POINTS OF INTEREST	2	1	2	\$600
E) COMPUTER WITH A "TOUCH SCREEN" MENU- DRIVEN INFORMATION SYSTEM	3	2	3	\$4000

Minimum time required for study:	16	2	6	24
Maximum time required for study:	32	5	16	48

Survey Results:

<u>Organization</u>	<u>Site</u>	<u>Visitor</u>
A) 0,+1, 0,+1,+1 = +1	0,+1, 0, 0,+1 = 0	+2,+1,+1,+1,+2 = +1
B) +1,+2,+1,+1,+2 = +1	+1,+2, 0, 0,+2 = +1	+3,+2,+2,+2,+3 = +2
C) +1,+1,+2,+2,+1 = +1	+1,+1,+1, 0,+1 = +1	+1,+1,+2,+2,+1 = +1
D) +2,+2,+2,+3,+2 = +2	+2,+2,+1, 0,+2 = +1	+2,+2,+3,+3,+2 = +2
E) +2,+3,+3,+3,+3 = +3	+3,+2,+1, 0,+2 = +2	+3,+3,+3,+3,+3 = +3

ITEM #14: BICYCLE PATH

A PLAN FOR A NEW BICYCLE PATH IS NEARING COMPLETION. THE PATH WILL BE FIVE MILES LONG, PAVED WITH ASPHALT, AND WILL WIND THROUGH A VARIETY OF SCENIC AREAS INCLUDING WOODS, OPEN FIELDS, AND SMALL RAVINES. UNDER CONSIDERATION ARE FOUR INTERPRETIVE STOPS MORE OR LESS EVENLY SPACED ALONG THE PATH. EACH STOP WOULD CONTAIN A WAYSIDE EXHIBIT AND A SMALL REST AREA; THE EXHIBITS WOULD BE KEYED TO FEATURES OF THE LANDSCAPE THROUGH WHICH THE TRAIL WOULD PASS. YOU MAY ALSO WISH TO INCLUDE A TRAIL WITH A SOIL SURFACE ALONGSIDE OF THE BICYCLE PATH FOR USE BY JOGGERS AND RUNNERS.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) BICYCLE PATH ONLY	1	-1	1	\$369600
B) BICYCLE PATH WITH FOUR INTERPRETIVE STOPS ALONG THE WAY	1	-1	2	\$374000
C) BICYCLE PATH WITH SOIL-SURFACED JOGGING/RUNNING TRAIL ALONGSIDE	1	-2	2	\$422400
D) BICYCLE PATH WITH JOGGING/RUNNING TRAIL AND FOUR INTERPRETIVE STOPS	1	-2	3	\$426800

Minimum time required for study: 16 80 16 32

Maximum time required for study: 48 100 32 64

Survey Results:

	Organization	Site	Visitor
A)	+1,+1,+1, 0,+2 = +1	-1,-1,-2, 0,-1 = -1	+1,+2,+1,+1,+1 = +1
B)	+1,+2,+1,-1,+2 = +1	-2,-1,-2,-1,+2 = -1	+1,+2,+2,+2,+3 = +2
C)	+2,+1,+2,-2,+2 = +1	-3,-2,-2,-2,-1 = -2	+2,+2,+2,+3,+1 = +2
D)	+3,+2,+2,-3,+2 = +1	-3,-2,-2,-3,+2 = -2	+3,+3,+2,+3,+3 = +3

ITEM #15: BULLETIN BOARD

IT IS THOUGHT THAT A BULLETIN BOARD OUTSIDE THE INTERPRETIVE CENTER WOULD BE A HELPFUL AID TO VISITORS. GENERAL INFORMATION, RULES AND REGULATIONS, SITE MANAGEMENT OBJECTIVES, PLACES TO STAY, AND LISTS OF THINGS TO SEE AND DO WOULD ALL BE PRESENTED ALONG WITH A SECTION WHICH COULD BE USED FOR VISITOR'S PERSONAL MESSAGES. YOU MAY CHOOSE TO LOCK THE BULLETIN BOARD BEHIND PROTECTIVE GLASS DOORS. IN ADDITION, YOU MUST DECIDE WHETHER OR NOT THE BOARD SHOULD BE LIGHTED FOR EASY NIGHT READING.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) SIMPLE BULLETIN BOARD	1	0	1	\$48
B) LIGHTED BULLETIN BOARD	1	-1	2	\$88
C) BULLETIN BOARD LOCKED BEHIND PROTECTIVE GLASS DOORS	1	0	1	\$248
D) LIGHTED BULLETIN BOARD LOCKED BEHIND PROTECTIVE GLASS DOORS	1	-1	2	\$288

Minimum time required for study:	3	4	4	12
Maximum time required for study:	8	10	8	20

Survey Results:

	Organization	Site	Visitor
A)	+1,+2, 0,+1,+1 = +1	-1,-1,-1, 0,+1 = 0	+1,+1, 0,+1,+2 = +1
B)	+1,+1,+1,+2,+1 = +1	-1,-2,-1, 0, 0 = -1	+1,+2,+1,+2,+2 = +2
C)	+1,+2,-1,+2,+2 = +1	-1,-1,-1, 0,+2 = 0	+1,+1,+1,+2,+2 = +1
D)	+1,+1,-1,+3,+2 = +1	-1,-2,-1, 0, 0 = -1	+1,+2,+1,+3,+2 = +2

ITEM #16: BIRD WATCHING BINOCULARS

A BI-WEEKLY BIRD WATCHING PROGRAM HAS BECOME QUITE POPULAR. MANY OF THE PARTICIPANTS DO NOT OWN BINOCULARS, PARTICULARLY THOSE WHO HAVE ONLY RECENTLY BECOME INTERESTED IN THE ACTIVITY. CONSIDERATION HAS BEEN GIVEN TO PURCHASING A NUMBER OF BINOCULARS WHICH COULD BE SHARED BY THE GROUP. DUE TO A GOOD BUSINESS ASSOCIATION WITH A LOCAL SUPPLIER, VERY HIGH QUALITY INSTRUMENTS CAN BE OBTAINED AT A LOW COST. YOU MUST DECIDE ON THE NUMBER OF BINOCULARS TO PURCHASE. THE AVERAGE SIZE OF A GROUP IS ABOUT 25, THOUGH ON SOME DAYS ATTENDANCE HAS REACHED 50 OR 60. TYPICALLY, HALF OF THE VISITORS BRING THEIR OWN BINOCULARS.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) 5 PAIR OF BINOCULARS	1	1	1	\$300
B) 10 PAIR OF BINOCULARS	1	1	2	\$600
C) 15 PAIR OF BINOCULARS	1	1	2	\$900
D) 20 PAIR OF BINOCULARS	1	1	2	\$1200
E) 25 PAIR OF BINOCULARS	0	1	2	\$1500
Minimum time required for study:	3	2	8	1
Maximum time required for study:	6	4	12	1

Survey Results:

Organization	Site	Visitor
A) +2,+1,-1,-1,+3 = +1	+1, 0, 0, 0,+2 = +1	+1,+2,+1,+1,+2 = +1
B) +1,+2,-1,-1,+3 = +1	+1, 0, 0, 0,+2 = +1	+2,+3,+1,+2,+2 = +2
C) -1,+2,+1,-1,+3 = +1	+1, 0, 0, 0,+2 = +1	+1,+3,+2,+3,+2 = +2
D) -2,+2,+2,-1,+2 = +1	+1, 0, 0, 0,+2 = +1	+1,+3,+2,+3,+3 = +2
E) -3,+2,-1,-1,+2 = 0	+1, 0, 0, 0,+2 = +1	+1,+3, 0,+3,+3 = +2

ITEM #17: WEATHER INSTRUMENTATION

CONSIDERATION IS BEING GIVEN TO THE PURCHASE OF SOME HIGH QUALITY WEATHER INSTRUMENTS IN ORDER TO ENHANCE AN INTERPRETIVE CENTER EXHIBIT DEALING WITH METEOROLOGIC CONDITIONS AT THE SITE. IT IS THOUGHT THAT THE DEVICES WILL NOT ONLY BE INTERESTING ADDITIONS TO THE EXHIBIT AREA BUT MAY ALSO PROVIDE VALUABLE INFORMATION TO THE STAFF. THE INSTRUMENTS UNDER CONSIDERATION ARE A THERMOMETER/HYGROMETER, A BAROMETER, AND A WIND SPEED AND DIRECTION INDICATOR. YOU MUST DECIDE WHICH INSTRUMENTS TO PURCHASE.

IMPLEMENTATION OPTIONS:

	O	S	V	\$
A) THERMOMETER/HYGROMETER	1	0	1	\$100
B) BAROMETER	0	0	1	\$90
C) WIND SPEED/DIRECTION INDICATOR	0	0	1	\$375
D) THERMOMETER/HYGROMETER AND BAROMETER	1	1	2	\$190
E) THERMOMETER/HYGROMETER, BAROMETER, AND WIND SPEED/DIRECTION INDICATOR	1	1	2	\$565

Minimum time required for study:	6	2	3	6
Maximum time required for study:	10	5	8	12

Survey Results:

Organization	Site	Visitor
A) +1,+1,+1,-1,+1 = +1	+1,-1, 0, 0,+1 = 0	+1,+2, 0,+1,+1 = +1
B) +1,+1,+1,-1, 0 = 0	+1,-1, 0, 0, 0 = 0	+1,+1, 0,+1, 0 = +1
C) +1,+1,+1,-1, 0 = 0	+1,-1, 0, 0,+1 = 0	+1,+2, 0,+1, 0 = +1
D) +2,+2,+1,-2,+2 = +1	+2,-1, 0, 0,+2 = +1	+2,+2,+1,+2,+2 = +2
E) +3,+2,+1,-3,+3 = +1	+3,-1, 0, 0,+2 = +1	+3,+2,+2,+3,+2 = +2

ITEM #18: MARSH AREA TRAIL

CONSIDERATION IS BEING GIVEN TO OPENING UP A MARSH AREA TO VISITORS. A QUARTER MILE TRAIL MUST BE CONSTRUCTED TO ALLOW ACCESS TO THE AREA. YOU MAY OPT TO HAVE THE PATH SIMPLY END IN A VIEWING AREA AT THE EDGE OF THE MARSH, CONSTRUCT A WOODEN OBSERVATION PLATFORM AT THE END OF THE TRAIL, OR ELECT TO BUILD A BOARDWALK EXTENDING OVER THE TOP OF THE MARSH FOR A DISTANCE OF ANOTHER QUARTER MILE.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) TRAIL LEADING TO A SIMPLE VIEWING AREA AT THE EDGE OF THE MARSH	1	-2	1	\$14500
B) TRAIL TO MARSH ENDING AT A WOODEN OBSERVATION PLATFORM	1	-1	2	\$15000
C) TRAIL LEADING TO A BOARDWALK EXTENDING THROUGH THE MARSH	1	-2	3	\$40000

Minimum time required for study:	20	48	16	16
Maximum time required for study:	28	72	48	32

Survey Results:

	Organization	Site	Visitor
A)	+1,+1,+1,+1,+1 = +1	0,-3,-1,-2,-3 = -2	+1,+1,+1,+1,+1 = +1
B)	+2,+1,+1,+1,+1 = +1	-1,-2,-1,-1,-2 = -1	+2,+2,+2,+2,+2 = +2
C)	+1,+1,+1,+1,+2 = +1	-2,-2,-2,-2,-1 = -2	+2,+2,+3,+3,+3 = +3

ITEM #19: CLEAN-UP ACTIVITY

SEVERAL AREAS OF THE SITE HAVE BECOME BADLY LITTERED. THOUGHT HAS BEEN GIVEN TO ASKING THE PUBLIC TO HELP ALLEVIATE THE PROBLEM. A "CLEAN-UP" INTERPRETIVE ACTIVITY IS BEING PLANNED--A FEW HOURS OF PICKING UP LITTER WOULD BE FOLLOWED BY INTERPRETIVE PROGRAMS WITH THEMES RELATED TO THE LOCATIONS IN WHICH THE WORK WAS PERFORMED. CONSIDERATION HAS ALSO BEEN GIVEN TO PROVIDING MEALS FOR THE VOLUNTEERS (THE MEALS WOULD CONSIST OF COOK-OUTS, HOT DOGS, HAMBURGERS, POTATO SALAD, ETC.). IN ANY CASE, YOU MUST DECIDE WHETHER ALL THE WORK SHOULD BE ATTEMPTED IN ONE DAY OR WHETHER TWO SUCH PROGRAMS SHOULD BE SCHEDULED. ABOUT THIRTY VOLUNTEERS CAN BE EXPECTED AT EACH EVENT.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) CLEAN-UP INTERPRETIVE ACTIVITY ONLY	1	1	1	\$0
B) CLEAN-UP INTERPRETIVE ACTIVITY WITH A MEAL PROVIDED FOR THE VOLUNTEERS	0	1	2	\$100
C) TWO CLEAN-UP INTERPRETIVE ACTIVITIES (NO MEALS PROVIDED)	1	2	1	\$0
D) TWO CLEAN-UP INTERPRETIVE ACTIVITIES WITH MEALS PROVIDED	0	2	2	\$200

Minimum time required for study:	4	1	3	2
Maximum time required for study:	16	2	16	3

Survey Results:

	Organization	Site	Visitor
A)	+1,+2,+1,-1,+2 = +1	+1,+1,+2,+1,+2 = +1	-1,+1,+1,+1,+2 = +1
B)	-1,+1,+1,-2,+3 = 0	-1,+1,+2,+1,+3 = +1	+1,+2,+2,+1,+2 = +2
C)	+1,+1,+2,-2,+2 = +1	+2,+1,+3,+2,+2 = +2	-1,+1,+1,+2,+2 = +1
D)	-1,+1,+2,-3,+2 = 0	-1,+1,+3,+2,+3 = +2	+1,+2,+2,+2,+2 = +2

ITEM #20: PROGRAMS FOR CHILDREN

TWO NEW INTERPRETIVE PROGRAMS SPECIFICALLY DESIGNED FOR CHILDREN HAVE BEEN SUGGESTED. THE FIRST OF THESE INVOLVES A PORTABLE PUPPET THEATER. STAFF AT THE SITE HAVE EXPRESSED AN INTEREST IN CONSTRUCTING THE THEATER AND MAKING THE PUPPETS IF PROVIDED WITH MATERIALS. THE SHOWS IN THE THEATER COULD ALSO BE WRITTEN AND PRODUCED BY THE STAFF. THE SECOND SUGGESTION PROPOSES TO ADD A BIMONTHLY INTERPRETIVE WALK ESPECIALLY FOR YOUNGSTERS. THE THEME OF THE WALK WOULD BE VARIED ACCORDING TO THE TIME OF YEAR. YOU MAY IMPLEMENT EITHER OR BOTH IDEAS. NOTE: ROUGHLY FORTY PERCENT OF THE VISITORS TO THE SITE ARE CHILDREN.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) PORTABLE PUPPET THEATER	0	0	1	\$150
B) BIMONTHLY INTERPRETIVE WALKS FOR CHILDREN	1	0	2	\$0
C) BOTH A PORTABLE PUPPET THEATER AND A BIMONTHLY INTERPRETIVE WALK PROGRAM	1	0	2	\$150
Minimum time required for study:	2	1	8	6
Maximum time required for study:	4	3	24	10

Survey Results:

	Organization	Site	Visitor
A)	+1,+1,-1,-1,+2 = 0	0,-1, 0, 0,1 = 0	+1,+1,+2,+1,+2 = +1
B)	+1,+2,+1,-1,+2 = +1	0, 0,-1,-1,2 = 0	+1,+1,+2,+1,+3 = +2
C)	+2,+1,+1,-2,+1 = +1	0,-1,-1,-1,2 = 0	+2,+2,+3,+2,+3 = +2

ITEM #21: COMMUNICATION SYSTEM

THREE LOCATIONS AT THE SITE MANNED BY INTERPRETIVE STAFF ARE CURRENTLY NOT CONNECTED BY ANY TYPE OF COMMUNICATION SYSTEM EVEN THOUGH SUCH AN ARRANGEMENT WOULD BE BENEFICIAL. EACH LOCATION IS SUPPLIED WITH ELECTRICITY. CERTAINLY ONE OPTION IS TO EXTEND TELEPHONE SERVICE TO THE THREE SPOTS--IF THIS CHOICE IS MADE, YOU MAY ALSO DECIDE TO INSTALL PAY TELEPHONES FOR PUBLIC USE. THE OTHER ALTERNATIVE IS AN INTERCOM SYSTEM, EITHER ONE REQUIRING OVERHEAD CONNECTING LINES OR A THREE-WAY RADIO SYSTEM. A RADIO INTERCOM SYSTEM WOULD PROVIDE POOR BUT UNDERSTANDABLE TRANSMISSIONS.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) THREE-WAY RADIO INTERCOM SYSTEM	1	0	1	\$150
B) INTERCOM UNITS CONNECTED BY WIRES	2	-1	1	\$3193
C) TELEPHONE SERVICE INSTALLED AT EACH SITE	2	-2	1	\$1072
D) TELEPHONE SERVICE INSTALLED AT EACH SITE WITH PUBLIC (PAY) TELEPHONES	2	-3	2	\$1072
Minimum time required for study:	2	8	6	16
Maximum time required for study:	18	88	42	32

Survey Results:

	Organization	Site	Visitor
A)	+1,-2,+1,+1,+2 = +1	+1, 0, 0, 0, 0 = 0	0,+1,-1,+2,+1 = +1
B)	+1,+2,+2,+2,+2 = +2	+1,-2,-2,-2,-2 = -1	0,+1,-1,+2,+1 = +1
C)	+3,-2,+3,+3,+3 = +2	+2,-3,-3,-2,-3 = -2	+2,+1,+1,+2,+1 = +1
D)	0, ?,+3,+3,+3 = +2	-2,-3,-3,-2,-3 = -3	+2,+1,+3,+3,+3 = +2

Question Marks ("?") indicate items not completed by the respondent.

ITEM #22: CAMPFIRE FACILITY

A NEW FACILITY IS DESIRED WHERE VISITORS COULD GATHER AROUND A FIRE FOR LATE EVENING INTERPRETIVE TALKS, GROUP SINGING, OR SKY INTERPRETATION. A FLAT, OPEN SPOT HAS ALREADY BEEN SELECTED FOR THE FACILITY, WHICH IS TO ACCOMMODATE 50. IF THE AREA IS SIMPLY CLEARED OF DEBRIS AND A CAMPFIRE CIRCLE IS OUTLINED WITH ROCKS, IT WOULD CERTAINLY BE ADEQUATE--VISITORS WOULD BE ENCOURAGED TO BRING BLANKETS OR OTHER ITEMS TO SIT ON. YOU MAY CONSIDER INVESTING MORE MONEY IN THE FIRE PIT, DIGGING A SMALL HOLE, LINING IT WITH STEEL, HAVING SOME MASONRY WORK DONE. BENCHES MADE OF SPLIT LOGS COULD BE CONSTRUCTED. A FINAL CHOICE WOULD BE TO BUILD A MODERN FACILITY WITH A PAVED AREA AND STURDY BENCHES.

IMPLEMENTATION OPTIONS:

	O	S	V	\$
A) CAMPFIRE CIRCLE LINED WITH ROCKS IN A SIMPLE CLEARED AREA	0	1	1	\$200
B) SIMPLE CLEARED AREA AS IN OPTION "A" BUT SURROUNDED BY SPLIT LOG BENCHES	1	0	2	\$900
C) CAMPFIRE PIT LINED WITH STEEL WITH A SMALL AMOUNT OF STONEMASONRY	1	-1	2	\$300
D) CAMPFIRE PIT AS IN OPTION "C" BUT SURROUNDED BY SPLIT LOG BENCHES	0	-1	2	\$1000
E) A MODERN PAVED CAMPFIRE FACILITY WITH STURDY BENCHES	0	-2	2	\$6000

Minimum time required for study:	6	40	8	24
Maximum time required for study:	18	80	24	32

Survey Results:

Organization	Site	Visitor
A) 0,-1,+1,+1,+1 = 0	+2,-1,+3,+1,-2 = +1	+2,-1,+2,+1,+1 = +1
B) -1,+2,+3,+1,+1 = +1	+2,-2,+3,+1,-2 = 0	+3,+2,+3,+2,+2 = +2
C) -1,+2,-1,+2,+1 = +1	-2,-2,-1,+2,-2 = -1	+2,+2,+1,+2,+2 = +2
D) -1,+2,-2,+2,+1 = 0	-2,-2,-2,+2,-2 = -1	+2,+2,-1,+3,+3 = +2
E) -1, ?, -3,+3,+1 = 0	-3,-3,-3,+3,-3 = -2	+3,+2,-3,+3,+3 = +2

Question Marks ("?") indicate items not completed by the respondent.

ITEM #23: WAYSIDE EXHIBIT

A NEED FOR A WAYSIDE EXHIBIT AT A REMOTE LOCATION HAS BEEN IDENTIFIED. IT HAS BEEN DECIDED THAT AN EXHIBIT SHELTER SHOULD BE ERECTED TO PROTECT THE DISPLAY (AND THE VIEWERS!) FROM THE ELEMENTS. THE SHELTER WILL BE A MODERN KIOSK CONSTRUCTED OF SIMPLE STONEWORK AND NATIVE WOOD. YOU MUST DECIDE ON THE TYPE OF EXHIBIT WHICH IS TO BE PLACED IN THE SHELTER. ARTWORK COULD BE USED TO CONVEY THE INTERPRETIVE MESSAGE. ALTERNATIVELY, PHOTOGRAPHS COULD BE EMPLOYED. FINALLY, A DIORAMA COULD BE BUILT AND DISPLAYED.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) WAYSIDE EXHIBIT USING ARTWORK TO CONVEY THE INTERPRETIVE MESSAGE	1	1	2	\$4000
B) WAYSIDE EXHIBIT USING PHOTOGRAPHS TO CONVEY THE INTERPRETIVE MESSAGE	1	0	2	\$4000
C) WAYSIDE EXHIBIT USING A DIORAMA TO CONVEY THE INTERPRETIVE MESSAGE	0	0	2	\$6000
Minimum time required for study:				
	4	32	4	14
Maximum time required for study:				
	16	64	12	40

Survey Results:

	Organization	Site	Visitor
A)	0,+2,+1,+1,+1 = +1	+2, 0,+2,+1,-2 = +1	+3,+2,+2,+1,+2 = +2
B)	0,+2,+2,+2,+1 = +1	-1, 0,+2,+2,-2 = 0	+1,+2,+2,+2,+2 = +2
C)	0,-3,+1,+3,+1 = 0	-1, 0,+1,+3,-2 = 0	+2,+2,+1,+3,+7 = +2

ITEM #24: DRINKING FOUNTAIN

THERE IS GENERAL AGREEMENT THAT A DRINKING FOUNTAIN INSTALLED IN FRONT OF THE INTERPRETIVE CENTER WOULD NOT ONLY BE APPRECIATED BY THE VISITORS BUT WOULD ALSO SERVE TO BRING ADDITIONAL PEOPLE INTO THE BUILDING. SPECIAL CONSIDERATION SHOULD BE GIVEN TO USE OF THE FOUNTAIN BY CHILDREN. ONE OPTION WOULD BE TO BUILD TWO STEPS ON ONE SIDE OF THE FIXTURE. ON THE OTHER HAND, TWO FOUNTAINS COULD BE INSTALLED, ONE LOWER THAN THE OTHER. IT SHOULD BE NOTED THAT A LOW FOUNTAIN COULD ALSO BE USED BY THOSE IN WHEELCHAIRS. WITH EITHER SCHEME, AN ADDITIONAL OPTION IS TO MAKE THE FIXTURE AESTHETICALLY PLEASING BY INCORPORATING IT AS PART OF A LARGE STONEWORK ARTIFICIAL WATERFALL.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) A DRINKING FOUNTAIN WITH TWO STEPS ON ONE SIDE	1	1	2	\$1650
B) TWO DRINKING FOUNTAINS, ONE LOWER THAN THE OTHER	0	-1	2	\$3300
C) A DRINKING FOUNTAIN (AND STEPS) BUILT IN THE SIDE OF A STONEWORK WATERFALL	0	-1	1	\$2650
D) A STONEWORK WATERFALL WITH TWO DRINKING FOUNTAINS, ONE LOW AND ONE HIGH	0	-2	2	\$4300
Minimum time required for study:	3	8	4	12
Maximum time required for study:	16	16	24	40

Survey Results

Organization	Site	Visitor
A) +2,+1,+1,+1,+2 = +1	+1, ?,+2,+1,-2 = +1	+3,+1,+2,+2,+2 = +2
B) -2, ?, -2,+2,+1 = 0	-2, ?, -3,+2,-2 = -1	+1,+3,+1,+2,+2 = +2
C) -2, ?, -2,+2,+1 = 0	-3, ?, -2,+2,-2 = -1	+1, ?, -2,+2,+2 = +1
D) -1,-2,-2,+2,+1 = 0	-3, ?, -3,+2,-2 = -2	+2,+3,-1,+3,+2 = +2

Question Marks ("?") indicate items not completed by the respondent.

ITEM #25: PARKING FACILITY FOR TRAIL

POOR PLANNING HAS LEFT LITTLE ROOM FOR PARKING AT THE ENTRANCE TO AN EXISTING SELF-GUIDED TRAIL. ADDITIONAL PARKING WOULD NOT ONLY BE CONVENIENT FOR VISITORS BUT WOULD ALSO INCREASE USE OF THE TRAIL. STUDIES HAVE SHOWN THAT TWENTY PARKING SPACES SHOULD BE ADEQUATE. THIS FACILITY COULD BE IMPLEMENTED IN ONE OF TWO WAYS. THE SHOULDERS OF THE ROADWAY COULD BE WIDENED AND PAVED ALLOWING CARS TO SIMPLY PULL OFF AND PARK. TO EASE CONGESTION, HOWEVER, YOU MAY ELECT TO BUILD A SMALL LOT WITH AN ENTRANCE CONNECTED TO THE MAIN ROADWAY.

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) TWENTY PARKING SPACES ADJACENT TO THE ROADWAY BUILT ON EXISTING SHOULDER	0	-1	1	\$7800
B) TWENTY-SPACE PARKING LOT WITH AN ENTRANCE CONNECTED TO THE MAIN ROAD	1	-1	3	\$9920

Minimum time required for study:	2	60	4	8
Maximum time required for study:	8	100	24	16

Survey Results:

	Organization	Site	Visitor
A)	-1,+2,-1,+1, 0 = 0	+1,-1,-2, 0,-3 = -1	+1,+3,-3,+1,+2 = +1
B)	-2,+3,+2,+2,-1 = +1	-2,-2,+2,+1,-3 = -1	+2,+3,+2,+3,+3 = +3

ITEM #26: INFORMATION DESK

A NEED HAS BEEN EVIDENCED FOR AN INFORMATION DESK AT THE INTERPRETIVE CENTER. THE DESK SHOULD BE MANNED WHENEVER THE CENTER IS OPEN; STUDIES HAVE SHOWN THAT ONE PERSON AT THE DESK SHOULD BE ADEQUATE EVEN DURING THE BUSIEST PERIODS. MANY WILLING VOLUNTEERS ARE AVAILABLE FOR STAFFING. YOUR JOB IS TO SELECT THE PROPER MIX OF VOLUNTEERS AND PROFESSIONAL INTERPRETERS. CERTAINLY, ONE GROUP OR THE OTHER COULD BE USED EXCLUSIVELY. ON THE OTHER HAND, THE DESK COULD BE STAFFED WITH PROFESSIONALS DURING PERIODS OF HIGH VISITATION AND THE VOLUNTEERS COULD BE ASKED TO COVER ALL OTHER TIMES. IT IS ASSUMED THAT THE PROFESSIONALS WOULD DO A BETTER JOB AND PRESENT A BETTER IMAGE.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) STAFF THE INFORMATION DESK WITH VOLUNTEERS ONLY	1	0	0	\$0
B) STAFF THE INFORMATION DESK WITH PROFESSIONAL INTERPRETERS ONLY	-1	1	3	\$0
C) USE PROFESSIONAL STAFF DURING BUSY PERIODS, VOLUNTEERS AT ALL OTHERS	1	1	2	\$0
Minimum time required for study:	4	1	3	1
Maximum time required for study:	8	3	7	1

Survey Results:

	Organization	Site	Visitor
A)	+3,+2,-2,+2,+2 = +1	0, 0,-2,+2, 0 = 0	-1,+2,-2,+1,+2 = 0
B)	-3,-2,-1,+2,+1 = -1	0, 0,+1,+2, 0 = +1	+3,+3,+3,+3,+3 = +3
C)	-1,-1,+2,+3,+2 = +1	0, 0,+2,+2, 0 = +1	+1,+3,+3,+2,+3 = +2

ITEM #27: SELF-GUIDED AUTO TOUR

THE ROUTE OF A NEW SELF-GUIDED AUTO TOUR HAS BEEN DESIGNED AND APPROVED. THE TOUR WILL TRAVEL OVER EXISTING ROADS AND WILL HAVE 25 STATIONS IDENTIFIED BY MARKER POSTS. CURRENT PLANS ARE TO PRINT 2000 LEAFLETS KEYED TO THE MARKERS. IT HAS BEEN SUGGESTED THAT, IN ADDITION, CASSETTE TAPES BE PRODUCED--USERS OF THE TRAIL WOULD HAVE THEIR CHOICE OF THE MEDIUM THEY PREFERRED. THE FACT THAT NOT ALL CARS HAVE CASSETTE TAPE PLAYERS MAY MAKE IT DESIRABLE TO PURCHASE SOME PLAYBACK UNITS FOR USE BY THE VISITORS. IT IS ASSUMED THAT 35 CASSETTES AND PLAYERS WILL BE SUFFICIENT. NOTE THAT ALL MATERIALS (LEAFLETS, TAPES, AND TAPE PLAYERS) WILL ONLY BE LOANED AND EXPECTED TO BE RETURNED.

IMPLEMENTATION OPTIONS:

	<u>O</u>	<u>S</u>	<u>V</u>	<u>\$</u>
A) 2000 LEAFLETS	1	0	1	\$410
B) 2000 LEAFLETS, 35 CASSETTE TAPES	1	0	2	\$494
C) 35 CASSETTE TAPES AND 35 CASSETTE TAPE PLAYERS	1	1	2	\$1484
D) 2000 LEAFLETS, 35 CASSETTE TAPES, AND 35 CASSETTE TAPE PLAYERS	0	1	3	\$1894

Minimum time required for study:	8	16	16	20
Maximum time required for study:	24	40	32	22

Survey Results:

<u>Organization</u>	<u>Site</u>	<u>Visitor</u>
A) -1,+1,+1,+1,+1 = +1	0, 0,+1, 0, 0 = 0	+1,+1,+1,+1,+2 = +1
B) -1,+1,+1,+2,+1 = +1	0, 0,+1, 0, 0 = 0	+2,+1,+1,+2,+2 = +2
C) -2,+2,+1,+2, 0 = +1	0,+1,+2, 0, 0 = +1	+2,+2,+2,+2,+2 = +2
D) -3, ?,+1,+3, 0 = 0	0,+1,+2, 0, 0 = +1	+3,+3,+3,+3,+3 = +3

Question Marks ("?") indicate items not completed by the respondent.

ITEM #28: BIRD FEEDING STATIONS

IT IS FELT THAT IT WOULD BE WORTHWHILE TO CONSIDER INSTALLING ONE OR TWO BIRD FEEDING STATIONS AT THE SITE. TWO POTENTIAL LOCATIONS FOR SUCH FEEDERS HAVE BEEN IDENTIFIED: ONE NEAR THE INTERPRETIVE CENTER AND THE OTHER ALONG AN EXISTING NATURE TRAIL. IF A FEEDER IS INSTALLED NEAR THE INTERPRETIVE CENTER, YOU MAY WISH TO CONSIDER THE CONSTRUCTION OF A ONE-WAY GLASS WINDOW IN THE WALL OF THE BUILDING. (NOTE: THE COST OF THIS ITEM WILL INCLUDE SUFFICIENT FUNDS TO KEEP THE FEEDING STATIONS SUPPLIED WITH FOOD FOR THE NEXT YEAR.)

IMPLEMENTATION OPTIONS.	O	S	V	\$
A) BIRD FEEDING STATION NEAR THE INTERPRETIVE CENTER	0	1	1	\$342
B) BIRD FEEDING STATION NEAR THE INTERPRETIVE CENTER PLUS A ONE-WAY WINDOW	1	1	2	\$1122
C) BIRD FEEDING STATION ALONG AN EXISTING TRAIL	0	1	0	\$342
D) BIRD FEEDING STATIONS AT BOTH LOCATIONS (TRAIL AND CENTER)	0	1	2	\$684
E) FEEDERS AT BOTH LOCATIONS PLUS A ONE-WAY WINDOW IN A WALL OF THE CENTER	1	1	3	\$1464
Minimum time required for study:	12	16	12	20
Maximum time required for study:	28	32	28	36

Survey Results:

Organization	Site	Visitor
A) 0,+1,+1,+1,-1 = 0	+1,+1,+1,+2,-1 = +1	+2,+1,+1,+1,+1 = +1
B) -1,+3,+1,+2, 0 = +1	+1,+1,+2,+2,-1 = +1	+3,+3,+2,+2,+2 = +2
C) 0,-1,+1,+1,-2 = 0	0,+1,+1,+2,-1 = +1	+1,-1,+1,+1, 0 = 0
D) 0,+1,+1,+2,-2 = 0	+1,+1,+2,+3,-1 = +1	+2,+1,+2,+2,+1 = +2
E) -1,+2,+2,+3,-1 = +1	+1,+1,+3,+3,-1 = +1	+3,+2,+3,+3,+2 = +3

ITEM #29: DIRECTIONAL SIGNS

IT HAS BEEN SUGGESTED THAT SIGNS BE INSTALLED AT MAJOR INTERSECTIONS OF THE SITE AS A DIRECTIONAL AID TO VISITORS. IT IS ENVISIONED THAT THESE AIDS WOULD BE DESIGNED AS WOODEN "TOTEM POLES" WITH SMALL POINTED SIGNS INDICATING THE DIRECTION OF AND DISTANCE TO FEATURES OF INTEREST. THE SIGNS WOULD BE ABOUT EIGHT FEET TALL WITH FIVE TO TEN POINTERS APIECE. YOU MUST DECIDE HOW MANY OF THESE UNITS TO INSTALL. THERE ARE TEN MAJOR INTERSECTIONS AT THE SITE. (IF LESS THAN TEN SIGNS ARE BUILT THEY WILL BE LOCATED AT THE BUSIEST INTERSECTIONS.)

IMPLEMENTATION OPTIONS:	O	S	V	\$
A) TWO DIRECTIONAL SIGNS	-1	-1	-1	\$260
B) FOUR DIRECTIONAL SIGNS	-1	-1	0	\$520
C) SIX DIRECTIONAL SIGNS	-1	-2	0	\$780
D) EIGHT DIRECTIONAL SIGNS	0	-1	1	\$1040
E) TEN DIRECTIONAL SIGNS	1	-1	2	\$1300
Minimum time required for study:	2	4	2	8
Maximum time required for study:	4	8	16	10

Survey Results:

	Organization	Site	Visitor
A)	-1, ?, -2, 0, 0 = -1	-1, -1, -3, 0, -1 = -1	-2, +1, -3, -1, +1 = -1
B)	-1, ?, -1, 0, 0 = -1	-2, -1, -2, 0, -1 = -1	-2, +1, -2, -1, +2 = 0
C)	-2, ?, -1, +1, 0 = -1	-3, -2, -1, -1, -1 = -2	-2, +1, -1, +1, +2 = 0
D)	-2, ?, +1, +2, 0 = 0	-3, -2, +1, -1, -1 = -1	-2, +1, +2, +2, +3 = +1
E)	-2, +1, +1, +3, 0 = +1	-3, -3, +2, -1, -1 = -1	-2, +2, +3, +3, +3 = +2

Question Marks ("?",) indicate items not completed by the respondent.

ITEM #30: PICNIC AREA

A PICNIC AREA CONSTRUCTED A FEW HUNDRED FEET FROM THE INTERPRETIVE CENTER COULD BE CONVENIENT FOR VISITORS AND MAY ALSO ATTRACT ADDITIONAL PEOPLE TO THE BUILDING. YOU MUST DECIDE HOW ELABORATE THE PICNIC FACILITY SHOULD BE. TWO PICNIC TABLES AND A METAL TRASH BASKET WOULD BE THE MINIMUM CONFIGURATION. ADDITIONAL TABLES AND BASKETS COULD BE CONSIDERED ALONG WITH THE INSTALLATION OF CHARCOAL GRILLS. YOU MAY EVEN DECIDE TO BUILD A GROUP SHELTER.

IMPLEMENTATION OPTIONS:				
	O	S	V	\$
A) TWO PICNIC TABLES AND A METAL TRASH BASKET	1	0	1	\$310
B) TWO PICNIC TABLES, A METAL TRASH BASKET AND ONE CHARCOAL GRILL	1	0	1	\$410
C) FOUR PICNIC TABLES, TWO METAL TRASH BASKETS AND ONE CHARCOAL GRILL	1	-1	1	\$720
D) EIGHT PICNIC TABLES, THREE METAL TRASH BASKETS AND TWO CHARCOAL GRILLS	0	-2	1	\$1380
E) A GROUP SHELTER CONTAINING ALL THE ITEMS MENTIONED ABOVE IN OPTION (D)	-1	-3	2	\$21380

Minimum time required for study:	8	16	8	8
Maximum time required for study:	16	32	24	24

Survey Results:

	Organization	Site	Visitor
A)	0,+1,+2, 0, 0 = +1	0,-1,+3, 0,-1 = 0	+1,+1,+3, 0,+1 = +1
B)	0,+1,+2, 0, 0 = +1	-1,-1,+2, 0,-1 = 0	+1,+1,+2, 0,+1 = +1
C)	-1,+2,+1,+1,+1 = +1	-1,-1,+1,-1,-2 = -1	+1,+2,+1,+1,+2 = +1
D)	-1,+2,-2,+2, 0 = 0	-2,-2,-2,-1,-2 = -2	+2,+2,-2,+2,+2 = +1
E)	-2, ?, -3,+3,-1 = -1	-3,-3,-3,-2,-3 = -3	+3,+3,-3,+3,+3 = +2

Question Marks ("?") indicate items not completed by the respondent.

APPENDIX D

Availability of INTERP and Documentation Package

Copies of the INTERP diskette along with a documentation package
can be obtained by writing to

INTERP
c/o Division of Environmental Education
The Ohio State University
2021 Coffey Road
Columbus, Ohio 43210

BIBLIOGRAPHY

The following provided good general background and suggested ideas for the items included in the game's master list:

Faflick, Philip. "Brutal Game of Survival." Time, 16 August 1982.

Hanna, John W., Compiler. Interpretive Skills for Environmental Communicators. Texas: Department of Recreation and Parks at Texas A&M University, 1974.

Lewis, William J. Interpreting for Park Visitors. Eastern Acorn Press, 1980.

Martin, James. Telecommunications and the Computer. New Jersey: Prentice-Hall, Inc., 1976.

Mullins, Gary W. "Plan Ahead for Interpretation." Land Between the Lakes (TVA) Planning Workshop, Golden Pond, Kentucky, 1980.

Mullins, Gary W. Class notes, Natural Resources 819, "Interpretive Research and Theory." School of Natural Resources, The Ohio State University, Winter Quarter, 1981.

Patten, Bernard C., Editor. Systems Analysis and Simulation in Ecology. New York: Academic Press, 1971.

Sharpe, Grant W. Interpreting the Environment. New York: John Wiley & Sons, Inc., 1976.

Tilden, Freeman. Interpreting Our Heritage. North Carolina: The University of North Carolina Press, 1978.

Trachtman, Paul. "A generation meets computers on the playing fields of Atari." Smithsonian, September 1981.

The following technical manuals were the chief source of information regarding the TRS-80 computer system:

LEVEL II BASIC Reference Manual. Published in the United States by Radio Shack, A Division of Tandy Corporation, 1979.

TRSDOS & DISK BASIC Reference Manual. Published in the United States by Radio Shack, A Division of Tandy Corporation, 1979.

The following bibliography is suggested for those desiring additional information on computer simulation:

Williams, Stephen L. and Williams, Rhonda E. Public Administration Series: Bibliography #P-18 on Computer Simulation. Illinois: Vance Bibliographies, 1978.